GREAT KAROO ELECTRICAL GRID INFRASTRUCTURE, NORTHERN CAPE, AND WESTERN CAPE PROVINCES

Basic Assessment Report

DFFE Reference: 14/12/16/3/3/1/2554

July 2022

savannah environmental

t +27 (0)11 656 3237 f +27 (0)86 684 0547

e info@savannahsa.com w www.savannahsa.com

Prepared for:

Great Karoo Renewable Energy (Pty) Ltd
53 Carlisle Street
Paarden Eiland
Cape Town
7405

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

DFFE Reference	:	14/12/16/3/3/1/2554
Title	:	Great Karoo Electrical Grid Infrastructure, Northern Cape and Western Cape Provinces
Authors	:	Savannah Environmental (Pty) Ltd Mmakoena Mmola Jo-Anne Thomas
Client	:	Great Karoo Renewable Energy (Pty) Ltd
Report Revision	:	Revision 1 – Basic Assessment Report for authority review and decision-making
Date	:	July 2022

When used as a reference this report should be cited as: Savannah Environmental (2022). Basic Assessment Report for the Great Karoo Electrical Grid Infrastructure near Richmond, Northern Cape and Western Cape Provinces.

PURPOSE OF THE BASIC ASSESSMENT REPORT

Great Karoo Renewable Energy (Pty) Ltd is proposing the development of a 132kV central collector substation and a 132kV double circuit power line on a site located approximately 35km south-west of Richmond and 80km south-east of Victoria West, within the Ubuntu Local Municipality of the Pixley Ka Seme District Municipality in the Northern Cape Province. A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province. The BA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This BA Report has been compiled in accordance with Appendix 1 of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) and consists of the following sections:

- **Chapter 1** provides background to the Great Karoo EGI and the basic assessment process.
- **Chapter 2** provides a description of the Great Karoo EGI.
- **Chapter 3** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed Great Karoo EGI.
- **Chapter 4** describes the need and desirability of the Great Karoo EGI within the identified project site.
- **Chapter 5** outlines the approach to undertaking the basic assessment process.
- **Chapter 6** describes the existing biophysical and socio-economic environment within and surrounding the project site.
- **Chapter 7** provides an assessment of the potential issues and impacts associated with the Great Karoo EGI, as well as cumulative impacts, and presents recommendations for the mitigation of significant 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 was made available for download and review from **Friday, 20 May 2022** until **Monday, 20 June 2022** on the Savannah Environmental website: https://savannahsa.com/public-documents/grid-infrastructure/the-great-karoo-cluster-grid-connection-infrastructure/. All comments received and recorded during the 30-day review and comment period have been included, considered, and addressed within this final BA Report submitted for the consideration of the Competent Authority. Changes made in this BA Report for submission have been underlined for ease of reference.

EXECUTIVE SUMMARY

Great Karoo Renewable Energy (Pty) Ltd is proposing the development of a 132kV central collector substation and a 132kV double circuit power line on a site located approximately 35km south-west of Richmond and 80km south-east of Victoria West, within the Ubuntu Local Municipality of the Pixley Ka Seme District Municipality in the Northern Cape Province (**Figure 1**). A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province. One grid corridor has been considered for the assessment and placement of the 132kV double circuit power line. The entire extent of the site falls within the Central Corridor of the Strategic Transmission Corridors[1]. The grid connection infrastructure is known as the Great Karoo Electrical Grid Infrastructure (EGI).

The development of the 132kV central collector substation and 132kV power line is required to enable the connection for the Great Karoo Cluster of Renewable Energy Facilities, which comprises three (3) 100MW Solar Photovoltaic (PV) Energy Facilities, and two (2) 140MW Wind Farms, to the national grid for the evacuation of the generated electricity (**Figure 2**). The connection point into the national grid will be the existing Eskom Gamma Substation.

Infrastructure associated with the proposed project will include the following:

- A 132kV collector substation with a development footprint of 19.95ha.
- A double circuit 132kV distribution line to connect the central collector 132kV substation to the existing Eskom Gamma Substation will be constructed.
- Temporary and permanent laydown areas.
- Associated equipment, infrastructure and buildings.
- A 4 -6 m wide road along the length of the power line corridor to allow for large crane movement and for maintenance purposes.

The projects which the proposed grid connection infrastructure will facilitate connection for are:

- Angora Wind Farm
- Merino Wind Farm
- Nku Solar PV Energy Facility
- Moriri Solar PV Energy Facility
- Kwana Solar PV Energy Facility

Each renewable energy facility forming part of this cluster is subject to a separate Environmental Impact Assessment (EIA) process. The renewable energy facilities will be connected to the 132kV central collector substation via 33kV underground cabling. The scope of this Basic Assessment (BA) Report is solely focused on the Great Karoo EGI which is the proposed grid connection solution for the above-mentioned renewable energy facilities. The above-mentioned renewable energy facilities are proposed in response to identified objectives of the national and provincial government, and local and district municipalities (refer to Chapter 3) to develop renewable energy facilities for power generation purposes.

[1] The Strategic Transmission Corridors are identified by the Department of Environment, Forestry and Fisheries (DEFF) as geographical areas of strategic importance for the development of the supporting large scale electricity transmission and distribution infrastructure in terms of Strategic Integrated Project 10: Electricity Transmission and distribution. This is as per GNR113 of February 2018.

It is the developer's intention to either bid the projects under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme, with the aim of evacuating the generated power into the national grid or supply the electricity to private off-takers nationally. The generated electricity will be evacuated through use of the 132kV central collector substation and 132kV double circuit power line and the national electricity grid. The development of the Great Karoo EGI will indirectly aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP). As the project has the potential to impact on the environment, an Environmental Authorisation (EA) is required from the National Department of Forestry, Fisheries, and the Environment (DFFE) subject to the completion of a BA process, as prescribed in Regulations 19 and 20 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), as amended.

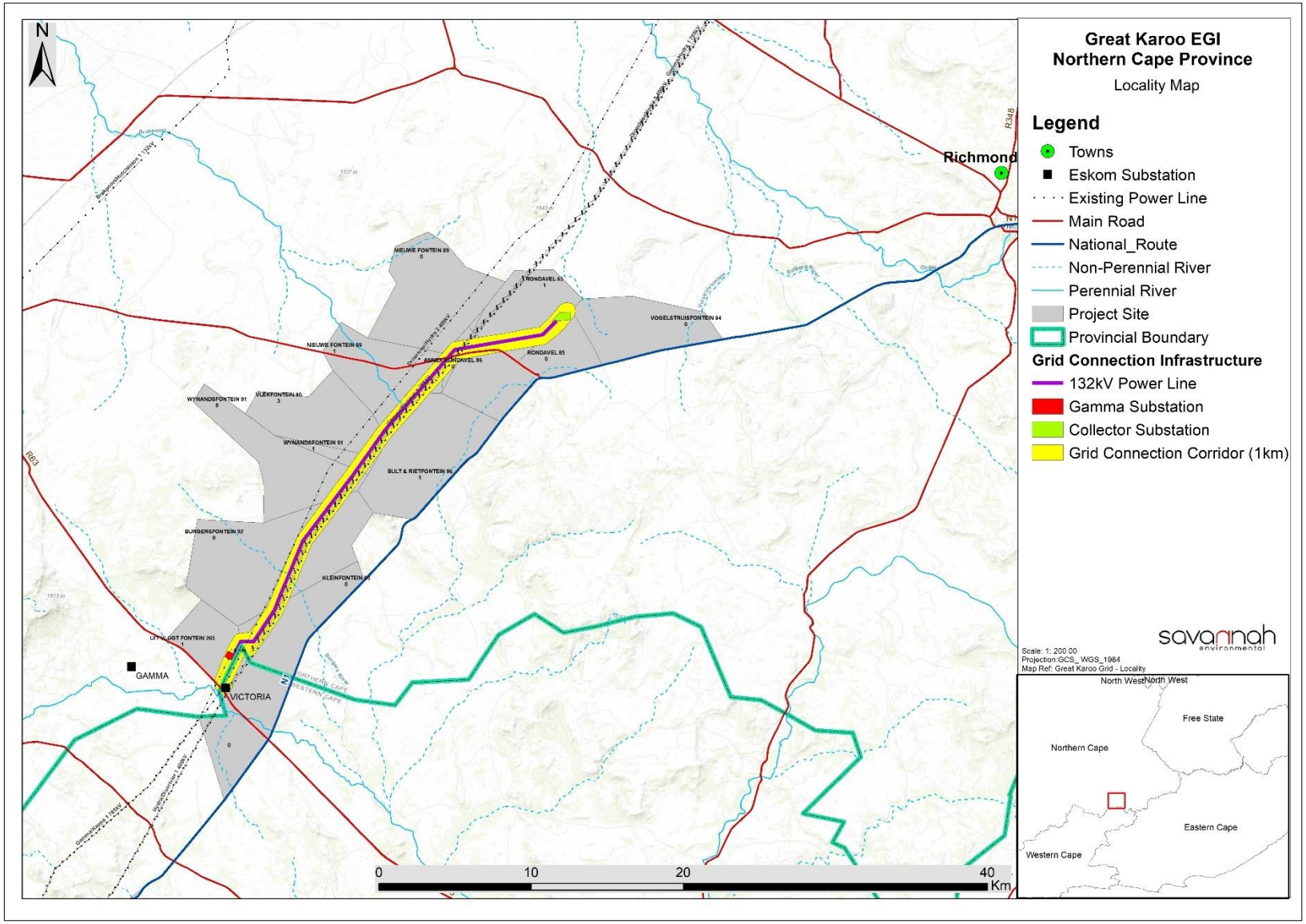


Figure 1: Locality map of the Great Karoo EGI in relation to the closest towns of the area

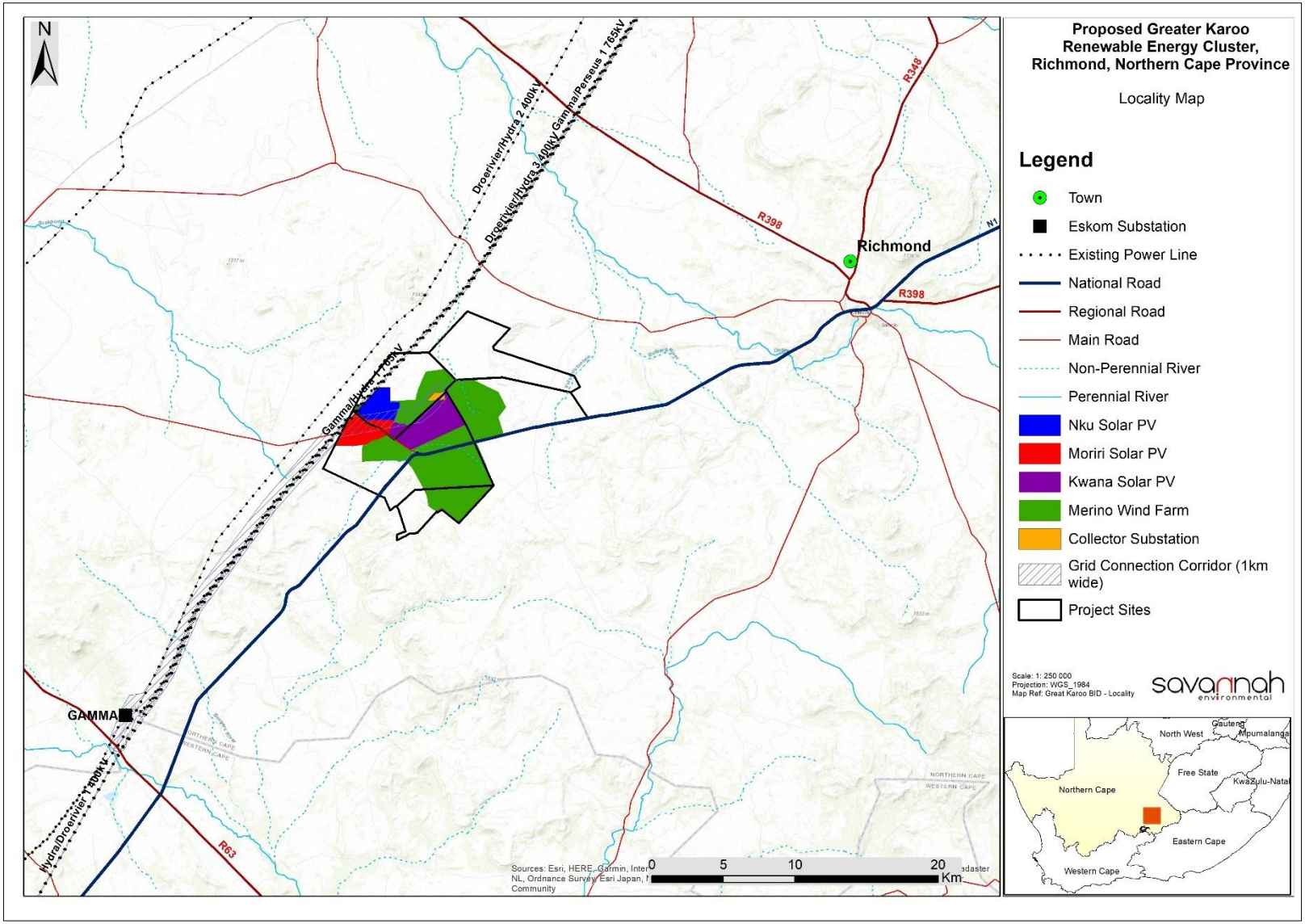


Figure 1.2: Location of the Great Karoo EGI in relation to the proposed renewable energy facilities that the proposed Great Karoo EGIA will cater for in terms of enabling grid connection

The environmental and social impacts associated with the proposed development have been assessed within site-specific specialist studies and assessments through the BA process in order to delineate areas of sensitivity within grid connection corridor and ultimately inform the placement of the collector substation and power line within areas considered suitable for development. A summary of the findings of each specialist assessment is provided below:

Impacts on Ecology (including Flora and Fauna)

The study area consists mostly of natural habitat that is used for commercial animal husbandry. There are existing transmission power lines running across the site with associated access tracks as well infrastructure associated with a farmstead (Rondavel), but no other infrastructure on site. Existing impacts on natural habitat are related to grazing effects and erosion in lowland areas. The proposal to build grid connection infrastructure will therefore have some effects on natural habitat. The existing biodiversity on site is, however, relatively limited in terms of uniqueness or potential presence of species of concern, with the possible presence of one Critically Endangered mammal species.

The vegetation on site is not considered to be part of any threatened ecosystem and has not been assessed as being of high conservation value due to rates of transformation. The regional vegetation types that occur on site, i.e., Eastern Upper Karoo and Upper Karoo Hardeveld, are both widespread and have low rates of transformation across their geographical range. There are three plant species of conservation concern that could possibly occur on site, but none were seen during general field surveys.

To determine sensitivity on site, local and regional factors were taken into account. There are some habitats on site that have been described as sensitive in their own right, irrespective of regional assessments. This includes primarily the dry stream beds and associated riparian zones. Rocky outcrops and steep slopes are more sensitive than surrounding areas, mainly due to higher floristic diversity and the likelihood of plant species with low local abundance occurring there.

At a regional level, the Critical Biodiversity Area (CBA) map for Northern Cape indicates one drainage line, along with a buffer on each side, that is designated as being a CBA1 area. The remaining drainage lines of the study area are indicated as being Ecological Support Areas (ESAs).

In terms of other species of concern and overall biological diversity, including both plants and animals, the low hills and mountain ranges are the areas with the most species as well as being most likely to contain any species of concern. However, the southern main drainage line is the most likely habitat for the Critically Endangered Riverine Rabbit, if it occurs on site, which is unknown but possible.

Potential negative impacts due to construction or operation of the proposed grid connection infrastructure on terrestrial ecology will have a significance of low or medium. If appropriate mitigation measures are put in place, all impacts can be reduced to having low significance after mitigation. On the basis of this assessment, the opinion is that the project should be able to proceed on condition the recommended mitigation measures are put in place to minimise predicted impacts.

Impacts on Aquatic Ecology

Based on a combination of desktop and in-field delineation, three (3) forms of a watercourses were identified and delineated within the corrodor. These include episodic rivers, drainage lines and dams. No

natural wetland systems, or even cryptic wetlands were identified for the project area. Episodic rivers refer to systems formed from run-off channels in very dry regions. The rivers and drainage lines are both classified as a river hydrogeomorphic (HGM) type systems. The dams are regarded as artificial systems and typically formed / created in the preferential flow paths of the river HGM types. The drainage lines are not characterised by riparian vegetation and grasses. These systems represent bare surfaces with evidence of surface run-off.

The results of the habitat assessment indicate natural (class A) and largely natural (class B) instream and riparian conditions for the catchment, respectively. The overall ecological importance and sensitivity for the area was determined to be high. The overall ecosystem service benefit for the system is moderate.

The recommended buffer was calculated to be 15m for the drainage lines and rivers for the construction and operational phases.

The pre-mitigation impact significance for all considered aspects is expected to be medium. The expected post-mitigation impact significance is expected to be low, should all mitigation measures and recommendations be implemented.

It is the opinion of the specialist that no fatal flaws are evident for the project. Due to the expected low port-mitigating risks, the project qualifies for a General Authorisation.

Impacts on Avifauna

The SABAP2 data indicates that a total of 167 bird species could potentially occur within the study area and immediate surroundings (Appendix 1 of the avifauna report provides a comprehensive list of all the species). Of these, 49 species are classified as priority species and 12 of these are South African Red List species. Of the priority species, 35 are likely to occur regularly at the study area and immediate surrounding area, and another 14 could occur sporadically.

An integrated pre-construction monitoring programme was implemented at the proposed Great Karoo Cluster of Renewable Energy Facilities (i.e., Kwana, Moriri and Nku Solar Energy Facilities (SEF) and Angora and Merino Wind Energy Facilities (WEF)) between October 2020 and November 2021. The programme comprised of six seasonal surveys of both the proposed study areas and an identified control site within the broader study area. In order to describe the avifaunal community present, a concerted effort was made to sample the avifauna in all of the primary habitats that were available by applying walked and driven transects, vantage point, focal point and incidental survey techniques.

The surveys produced a combined list of 113 species (Appendix 3) covering both the Great Karoo Cluster of Renewable Energy Facilities study area and to a limited extent, the surrounding area.

The expected impacts of the Great Karoo EGI 132kV central collector substation and 132kV overhead power line were rated to be of MEDIUM significance and negative status pre-mitigation. However, with appropriate mitigation, the overall post-mitigation significance of the identified impacts should be reduced to LOW negative. No fatal flaws were discovered in the course of the investigation. It is therefore recommended that the activity is authorised, on condition that the proposed mitigation measures are strictly implemented.

Impacts on Land Use, Soils, and Agricultural Potential

Various soil forms were identified within the project area with the most sensitive soils being classified as the Tubatse, Oakleaf and Bethesda soil forms. These soil forms have been determined to be associated with one land capability, namely LCIII (grazing land). This land capability class was then further refined to a land potential level 6 by comparing land capability of climatic capabilities of the project area.

This land potential level was used to determine the sensitivities of soil resources. Only "Low" sensitivities were determined throughout the project area by means of baseline findings.

Low pre- and post-mitigation significance ratings are expected for the construction phase. During the operational phase, the pre-mitigation significance will be medium. This can be reduced to low significance through implementation of the recommended mitigation measures.

Considering the low sensitivities associated with land potential resources, it is the specialist's opinion that the proposed activities will have an acceptable impact on soil resources and that the proposed activities should proceed as have been planned.

Heritage Impacts (including Archaeology, Palaeontology and Cultural Landscape)

The landscape of the development area has been assessed for cultural heritage significance, and found to have five distinct character areas:

» Historic movement corridors.
» Open plains interrupted by low koppies.
» Elevated areas with steep sided mountain ridges.
» Areas of landscape that have been transformed by significant infrastructural development.
» Remote landscape with wilderness qualities.

Of the five distinct character areas identified in the Cultural Landscape Assessment (Winter, 2021), the grid connection corridor falls within Area 4 - Areas of landscape that have been transformed by significant infrastructural development.

A total of thirty (30) archaeological observations were identified along the grid corridor. None of the identified archaeological resources were determined to be conservation worthy. Six modern windmill and water storage structures were identified within the grid alignment but none of these were determined to be conservation worthy. No palaeontological Very High Sensitivity / No-Go areas have been identified within the grid connection project areas. With the exception of two fossil sites of low scientific value, none of the recorded fossil sites overlaps directly with, or lies close to (< 20 m), the proposed infrastructure. It is not anticipated that the proposed development of the grid connection infrastructure will negatively impact on significant heritage resources.

Visual Impacts

The construction and operation of the proposed grid connection infrastructure for the Great Karoo Cluster of Renewable Energy Facilities, may have a visual impact on the study area, especially within (but potentially

not restricted to) a 0.5 - 1.5km radius of the power line and substation structures. The visual impact will differ amongst places, depending on the distance from the infrastructure.

Overall, the significance of the visual impacts is expected to range from moderate to low as a result of the generally undeveloped character of the landscape. No visual impacts of a high significance are expected to occur.

Given the remote location of the infrastructure, the general absence of sensitive visual receptors and the close proximity of the proposed alignments next to each other, either of the power line alternatives would be acceptable.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed grid connection infrastructure.

If mitigation is implemented as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the grid connection infrastructure for the Great Karoo Cluster of Renewable Energy Facilities is considered to be acceptable from a visual impact perspective.

Social Impacts

Impacts are expected to occur with the development of the Great Karoo EGI during the construction, operation and decommissioning phases. Both positive and negative impacts are identified and assessed.

Positive impacts during construction include:
» Creation of employment and business opportunities, and the opportunity for skills development and on-site training.

Negative impacts during construction include:
» Impacts associated with the presence of construction workers on local communities.
» Noise, dust, and safety impacts of construction related activities and vehicles.
» Risk of veld fires.
» Risks posed to farming activities by construction workers.

Positive impacts during operation include:
» Improved energy security and establishment of energy infrastructure.
» Creation of employment, skills development, and local procurement opportunities.
» Generate income for landowners.

Negative impacts during operation include:
» The visual impacts and associated impact on sense of place.
» Risks posed to farming activities by maintenance workers.

Social impacts during the decommissioning phase are expected to be similar to those that take place during the construction phase.

The energy security benefits associated with the proposed Great Karoo Renewable Energy Cluster are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. The findings of the SIA indicate that the significance of the potential negative social impacts for both the construction and operational phase of the proposed grid connection are Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The alignment was also regarded as acceptable by affected landowners interviewed.

The power line is also located within the Central Transmission Corridor. The establishment of proposed Great Karoo Electrical Grid Infrastructure (EGI) is therefore supported by the findings of the SIA.

Cumulative Impacts

Cumulative impacts are expected to occur with the development of the Great Karoo EGI 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 Great Karoo EGI is to test 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.

Based on the specialist cumulative assessment and findings, the development of the Great Karoo and its contribution to the overall impact of all grid connection infrastructure within the broader area, it can be concluded that the Great Karoo cumulative impacts will be of a medium to low significance. Therefore, the development of the Great Karoo EGI will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

Environmental Sensitivity Mapping

As part of the specialist studies undertaken within the development footprint of the 132kV collector substation, and 1km power line corridor, specific sensitive environmental features and areas were identified (refer to **Figure 3**). The sensitive features identified specifically relate to terrestrial and aquatic ecology, avifauna, and heritage resources, and are detailed below:

- **Terrestrial Ecology:** Sensitivities that occur within the grid connection corridor include:
  - Drainage lines/CBA1 (high – very high sensitivity)
  - Mountain slopes (medium – high sensitivity)
  - Karroid plains (medium sensitivity)
  - Infrastructure (roads) (low sensitivity)
- **Aquatic Ecology:** The drainage lines and rivers that traverse the grid connection corridor are considered to be of high sensitivity and a 15m no-go buffer has been recommended around these features.
- **Avifauna:** At a site-specific level, environmentally sensitive features present within the proposed study area include the existing eagle nests, in addition to permanent and ephemeral waterbodies. These areas are classified as areas of HIGH sensitivity. Construction in the areas containing eagle nests will need to be carefully managed to ensure minimal disturbance to the breeding birds and/or their progeny. The construction of the proposed power line across or within close proximity to the waterbodies will necessitate the marking of the power line with bird flight diverters to mitigate the collision impact. The

remainder of the study area is considered to be of MEDIUM sensitivity, given its propensity to support Ludwig's Bustard.

» **Heritage:** A total of thirty (30) archaeological heritage resources and six (6) palaeontological heritage resources were identified during the survey of the grid connection corridor and substation footprint. None of the identified heritage resources are regarded to be conservation worthy or of significance and as such, no buffers have been recommended around these sites.

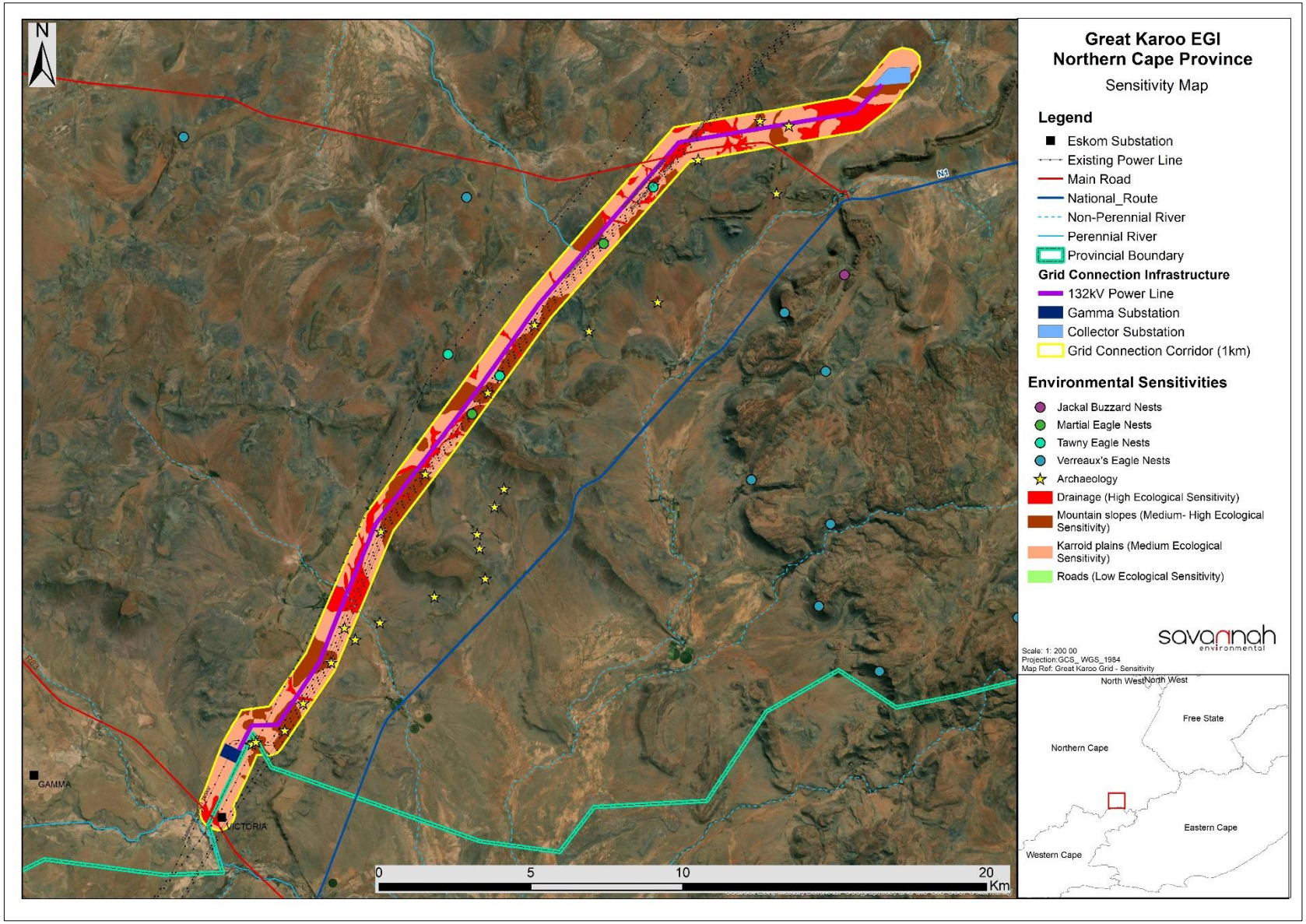


Figure 2: Environmental sensitivity and layout map of the Great Karoo EGI

Conclusion

Independent specialists appointed to undertake the assessment of potential impacts associated with the project assessed the substation footprint and power line corridor. The Specialists considered desktop data, field work, existing literature, and the National Web-based Environmental Screening Tool to inform the identification of sensitivities.

The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the development footprint and assessed corridor within the project site. The developer has designed a project development footprint and power line corridor in response to the identified sensitive environmental features and areas present within the project site. The location of the central collector substation was informed by environmental sensitivities within the development area for the Merino Wind Farm (one of the renewable energy facilities that the Great Karoo EGI will provide a grid connection solution).

Impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. This is however not relevant for the visual impact of the infrastructure as the substation and power line will be visible regardless of the mitigation applied. However, this impact is not considered as a fatal flaw by the specialist.

As detailed in the cost-benefit analysis, the benefits of the Great Karoo EGI are expected to occur at a national, regional, and local level. As the costs to the environment at a site-specific level will be largely limited through the appropriate placement of infrastructure within the corridor and footprint and thereby ensuring the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the proposed infrastructure. From an economic perspective, both positive and negative impacts are expected

Based on the conclusions of the specialist studies undertaken, it can be concluded that the development of the Great Karoo EGI will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from Department of Forestry, Fisheries and the Environment (DFFE).

The following infrastructure would be included within an authorisation issued for the project:

- A 132kV collector substation with a development footprint of 19.95ha.
- A double-circuit 132kV distribution line to connect the central collector 132kV substation to the existing Eskom Gamma Substation will be constructed.
- Temporary and permanent laydown areas.
- Associated equipment, infrastructure and buildings.
- A 4 -6 m wide road along the length of the power line corridor to allow for large crane movement and for maintenance purposes.

Key conditions that would be required to be included within an authorisation issued for the Great Karoo EGI are detailed in **Chapter 8**.

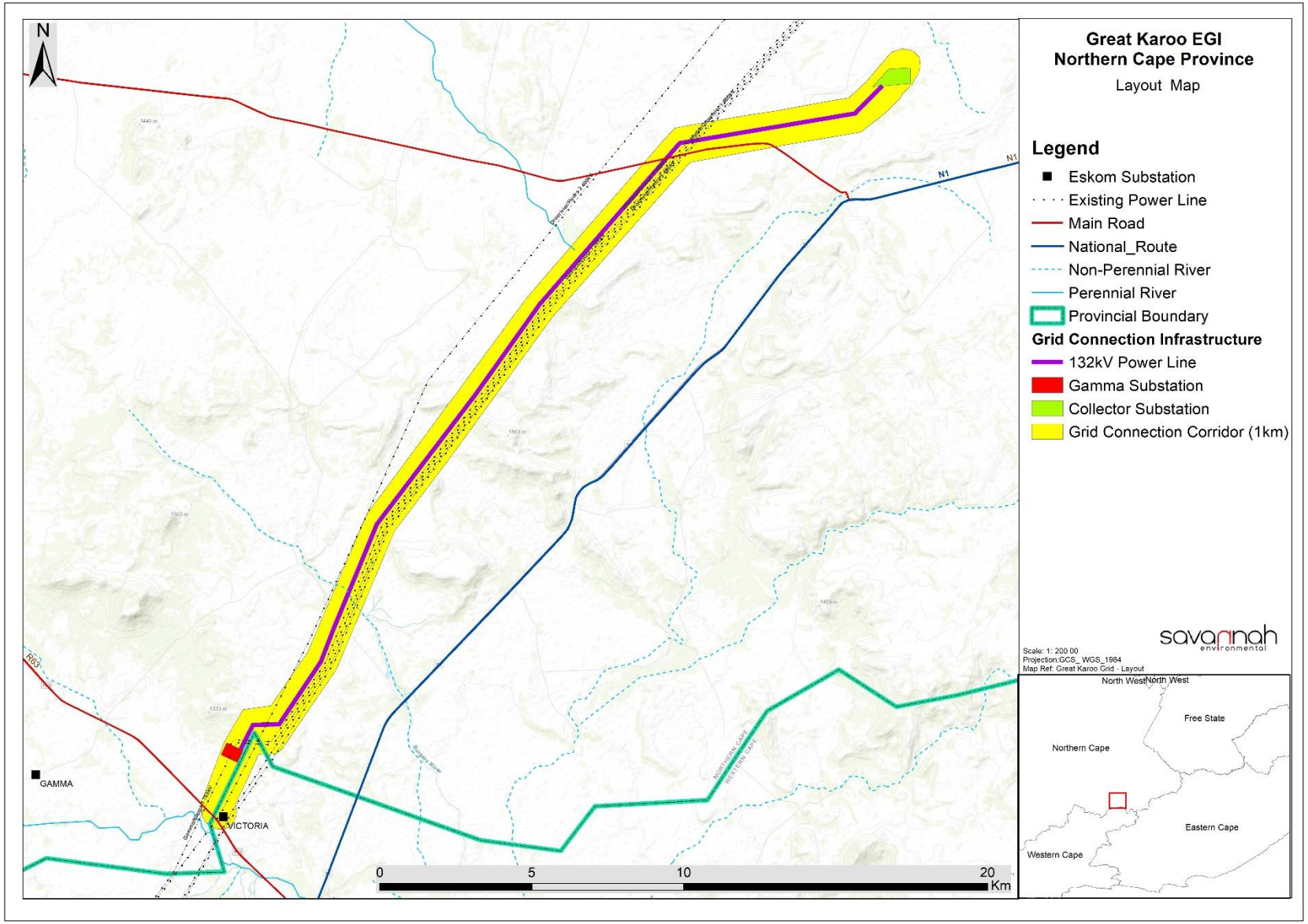


Figure 3: Final preferred layout for the Great Karoo EGI considered to be acceptable for development

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.

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.

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

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

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

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.

Development footprint: The area on which the proposed development will take place and includes any area to be disturbed.

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 (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application. The aim of EIA is to identify, predict and evaluate the actual and potential risks for and impacts on the geographical, physical, biological, social, economic and cultural aspects of the environment, in order to find the alternatives and options that best avoid negative impacts altogether, or where negative impacts cannot be avoided, to minimise and manage negative impacts to acceptable levels, while optimising positive impacts, to ensure that ecological sustainable development and justifiable social and economic development9 outcomes are achieved.

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.
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).

Residual Risk: The risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).

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

TABLE OF CONTENTS

APPENDICES

Appendix A: EIA Project Consulting Team CVs
Appendix B: Authority Consultation
Appendix C: Public Participation Process
Appendix C1: Public Participation Plan and Approval
Appendix C2: I&AP Database
Appendix C3: Site Notices and Newspaper Advertisements
Appendix C4: Background Information Document
Appendix C5: Organs of State Correspondence
Appendix C6: I&AP Correspondence
Appendix C7: Comments Received
Appendix C8: Minutes of Meetings
Appendix C9: Comments and Responses Report
Appendix D: Terrestrial Ecology Impact Assessment
Appendix E: Freshwater Impact Assessment
Appendix F: Avifauna Impact Assessment
Appendix G: Soils and Agricultural Potential Impact Assessment
Appendix H: Heritage Impact Assessment
Appendix I: Visual Impact Assessment
Appendix J: Social Impact Assessment
Appendix K: Specialist Declaration of Interest
Appendix L: Maps (A3)
Appendix M: DFFE Screening Tool Report
Appendix N: Generic Environmental Management Programmes for Overhead Power Lines
Appendix O: Generic Environmental Management Programmes for Substations
Appendix P: EAP Declaration of Independence and Affirmation
Appendix Q: Coordinates for the Proposed Infrastructure

CHAPTER 1: INTRODUCTION

Great Karoo Renewable Energy (Pty) Ltd is proposing the development of a 132kV central collector substation and a 132kV double circuit power line on a site located approximately 35km south-west of Richmond and 80km south-east of Victoria West, within the Ubuntu Local Municipality of the Pixley Ka Seme District Municipality in the Northern Cape Province (**Figure 1.1**). A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province. One grid corridor has been considered for the assessment and placement of the 132kV double circuit power line. The entire extent of the site falls within the Central Corridor of the Strategic Transmission Corridors[2]. The grid connection infrastructure is known as the Great Karoo Electrical Grid Infrastructure (EGI).

The development of the 132kV central collector substation and 132kV power line is required to enable the connection for the Great Karoo Cluster of Renewable Energy Facilities, which comprises three (3) 100MW Solar Photovoltaic (PV) Energy Facilities, and two (2) 140MW Wind Farms, to the national grid for the evacuation of the generated electricity (**Figure 1.2**). The connection point into the national grid will be the existing Eskom Gamma Substation.

Infrastructure associated with the proposed project will include the following:

- A 132kV collector substation with a development footprint of 19.95ha.
- A double circuit 132kV distribution line to connect the central collector 132kV substation to the existing Eskom Gamma Substation will be constructed.
- Temporary and permanent laydown areas.
- Associated equipment, infrastructure and buildings.
- A 4 -6 m wide road along the length of the power line corridor to allow for large crane movement and for maintenance purposes.

The projects which the proposed grid connection infrastructure will facilitate connection for are:

- Angora Wind Farm
- Merino Wind Farm
- Nku Solar PV Energy Facility
- Moriri Solar PV Energy Facility
- Kwana Solar PV Energy Facility

Each renewable energy facility forming part of this cluster is subject to a separate Environmental Impact Assessment (EIA) process. The renewable energy facilities will be connected to the 132kV central collector substation via 33kV underground cabling. The scope of this Basic Assessment (BA) Report is solely focused on the Great Karoo EGI which is the proposed grid connection solution for the above-mentioned renewable energy facilities.

[2] The Strategic Transmission Corridors are identified by the Department of Environment, Forestry and Fisheries (DEFF) as geographical areas of strategic importance for the development of the supporting large scale electricity transmission and distribution infrastructure in terms of Strategic Integrated Project 10: Electricity Transmission and distribution. This is as per GNR113 of February 2018.

The above-mentioned renewable energy facilities are proposed in response to identified objectives of the national and provincial government, and local and district municipalities (refer to Chapter 3) to develop renewable energy facilities for power generation purposes. It is the developer's intention to either bid the projects under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme, with the aim of evacuating the generated power into the national grid or supply the electricity to private off-takers nationally. The generated electricity will be evacuated through use of the 132kV central collector substation and 132kV double circuit power line and the national electricity grid. The development of the Great Karoo EGI will indirectly aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP).

As the project has the potential to impact on the environment, an Environmental Authorisation (EA) is required from the National Department of Forestry, Fisheries, and the Environment (DFFE) subject to the completion of a BA process, as prescribed in Regulations 19 and 20 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), as amended. The requirement for EA subject to the completion of a BA process is triggered by the inclusion of, amongst others, Activity 11 of Listing Notice 1 (GNR 327), namely:

"*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*."

In terms of Government Notice R779 of 1 July 2016, the Minister of DFFE is the Competent Authority for all activities relating to the IRP of 2010 – 2030 (and any updates thereto) which may not commence without EA. As the application for EA for this application relates to the proposed 132kV central collector substation and 132kV double circuit power line associated with the Great Karoo Cluster of Renewable Energy Facilities, which are related to the IRP and national energy provision, the Minister is the Competent Authority.

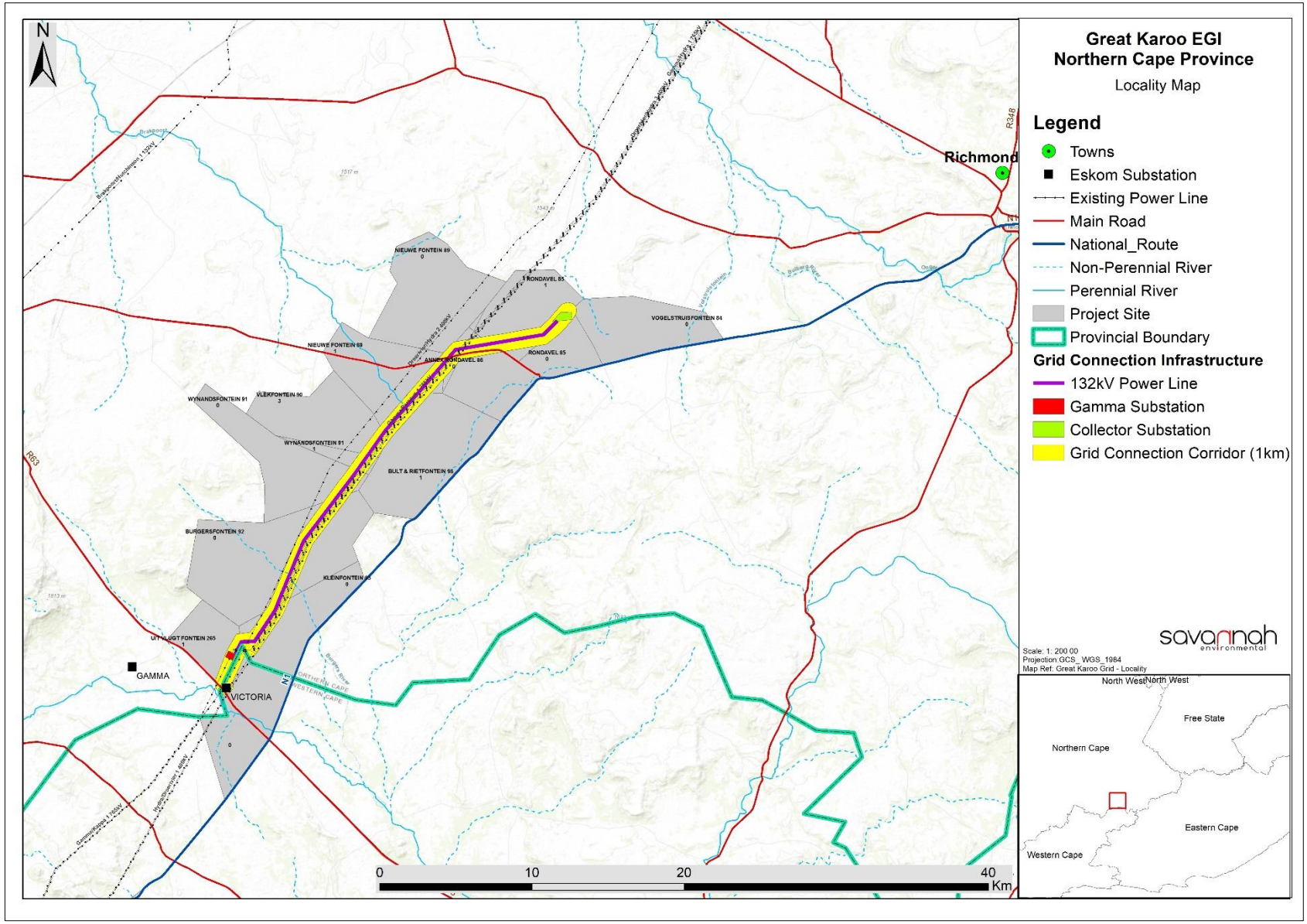


Figure 1.1: Locality map showing the Great Karoo EGI in relation to the closest towns of the area

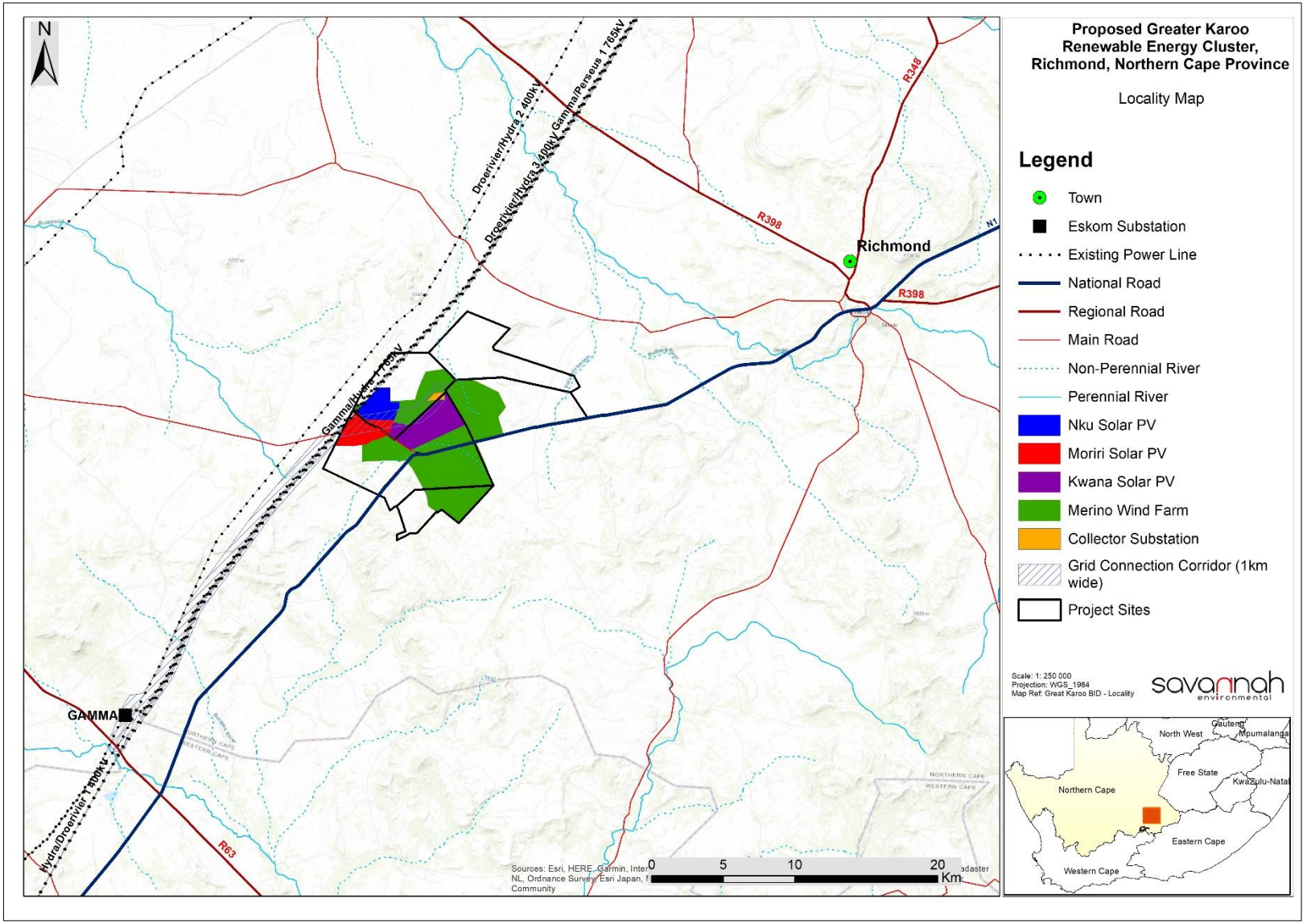


Figure 1.2: Location of the Great Karoo EGI in relation to the proposed renewable energy facilities that the proposed Great Karoo EGIA will cater for in terms of enabling grid connection

1.1 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 in April 2017) 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 1.3**. 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 21digit 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 Great Karoo EGI is included in **section 1.2**, **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.

This BA Report describes and assesses this proposed project and consists of the following chapters:

- **Chapter 1** provides background to the Great Karoo EGI and the basic assessment process.
- **Chapter 2** provides a description of the Great Karoo EGI.
- **Chapter 3** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed Great Karoo EGI.
- **Chapter 4** describes the need and desirability of the Great Karoo EGI within the identified project site.
- **Chapter 5** outlines the approach to undertaking the basic assessment process.
- **Chapter 6** describes the existing biophysical and socio-economic environment within and surrounding the project site.
- **Chapter 7** provides an assessment of the potential issues and impacts associated with the Great Karoo EGI, as well as cumulative impacts, and presents recommendations for the mitigation of significant 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.

1.2 Project Overview

A preferred project site has been identified by Great Karoo Renewable Energy (Pty) Ltd as a technically suitable area for the development of the Great Karoo EGI. The central collector substation, which comprises both an Eskom portion and an IPP portion[3], is proposed on Portions 0 and 1 of the Farm Rondavel 85. The following affected properties are traversed by the grid corridor (**Table 1.1**):

- Portion 0 of Farm Annex Rondavel 86

[3] The IPP Portion of the Central Collector Substation is being assessed as part of the Great Karoo Cluster of Renewable Energy Facilities. This BA Report only considers the Eskom Portion of the Substation.

- Portion 1of Farm Uit Vlugt Fontein 265
- Portion 0 of Farm Wynandsfontein 91
- Portion 1 of Farm Wynandsfontein 91
- Portion 3 of Farm Vlekfontein 90
- Portion 0 of Farm Burgersfontein 92
- Portion 0 of Farm Nieuwe Fontein 89
- Portion 1 of Farm Nieuwe Fontein 89
- Portion 0 of Farm Rondavel 85
- Portion 1 of Farm Rondavel 85
- Portion 0 of Farm Kleinfontein 93
- Portion 1 of Farm Bult & Rietfontein 96
- Remaining Extent of Farm Schietkuil 3

A development footprint of 19.95ha for the placement of the132kV central collector substation has been identified within the project site and assessed as part of the BA process. One grid corridor of up to 1km in width and 37.5km in length has been identified for the placement of the proposed 132kV double circuit power line and is assessed as part of this BA process.

During construction, a permanent access road along the length of the power line corridor between 4 - 6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation.

The nature and extent of the proposed EGI, as well as the potential environmental impacts associated with the construction, operation and decommissioning phases of the proposed infrastructure are assessed in this BA Report. Site specific environmental issues and constraints within the assessment corridor are considered within independent specialist studies in order to test the environmental suitability of the corridor for the proposed project, delineate areas of sensitivity within the corridor, and ultimately inform the placement of the power line within the assessment corridor.

Table 1.1. provides a summary of the location of the Great Karoo EGI. The key infrastructure components that form part of the project are described in greater detail in Chapter 2 of this BA Report.

Table 1.1: Details of the location of the Great Karoo EGI

Province	**Northern Cape Province and Western Cape Province**
District Municipality	Pixley Ka Seme District Municipality and Central Karoo District Municipality
Local Municipality	Ubuntu Local Municipality and Beaufort West Local Municipality
Ward number(s)	Ward 3 (Ubuntu Local Municipality) and Ward 1 (Beaufort West Local Municipality)
Nearest town(s) (measured from the centre of the project site)	Richmond (~35km south-west) and Victoria West (~80km south-east)
Affected Properties: Farm name(s), number(s) and portion numbers	» Portion 0 of Farm Annex Rondavel 86 » Portion 1of Farm Uit Vlugt Fontein 265 » Portion 0 of Farm Wynandsfontein 91 » Portion 1 of Farm Wynandsfontein 91 » Portion 3 of Farm Vlekfontein 90 » Portion 0 of Farm Burgersfontein 92 » Portion 0 of Farm Nieuwe Fontein 89

	» Portion 1 of Farm Nieuwe Fontein 89 » Portion 0 of Farm Rondavel 85 » Portion 1 of Farm Rondavel 85 » Portion 0 of Farm Kleinfontein 93 » Portion 1 of Farm Bult & Rietfontein 96 » Remaining Extent of Farm Schietkuil 3
SG 21 Digit Code (s)	» Portion 0 of Farm Annex Rondavel 86: C06300000000008600000 » Portion 1of Farm Uit Vlugt Fontein 265: C06300000000026500001 » Portion 0 of Farm Wynandsfontein 91: C06300000000009100000 » Portion 1 of Farm Wynandsfontein 91: C06300000000009100001 » Portion 3 of Farm Vlekfontein 90: C06300000000009000003 » Portion 0 of Farm Burgersfontein 92: C06300000000009200000 » Portion 1 of Farm Nieuwe Fontein 89: C06300000000008900001 » Portion 0 of Farm Rondavel 85: C06300000000008500000 » Portion 1 of Farm Rondavel 85: C06300000000008500001 » Portion 0 of Farm Kleinfontein 93: C06300000000009300000 » Portion 1 of Farm Bult & Rietfontein 96: C06300000000009600001 » Remaining Extent of Farm Schietkuil 3: C06300000000000300000
Current zoning and Land Use	Agriculture
Site co-ordinates (centre of project site)	31°33'32.60"S; 23°30'2.24"E
Coordinates of the power line corridor and the central collector substation	

Central Collector Substation		
Great Karoo EGI	**Lat**	**Long**
	Centre Coordinates	
	31°28'21.93"S	23°38'2.75"E
	Corner Coordinates	
	31°28'13.91"S	23°37'53.22"E
	31°28'11.83"S	23°38'20.01"E
	31°28'28.91"S	23°38'21.02"E
	31°28'33.05"S	23°37'33.58"E

Grid Corridor		
Point	**Latitude**	**Longitude**
Start Point	31°27'54.54"S	23°38'23.54"E
Middle Point	31°34'0.85"S	23°29'35.40"E
End Point	31°42'0.68"S	23°24'5.71"E

1.3 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), Wind Relic (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd as the independent Environmental Assessment consultant to undertake the Basic Assessment and prepare the BA Report for the REDZ 3 Power Corridor 400MTS. Neither Savannah Environmental nor any of its specialists are subsidiaries of, or are affiliated Wind Relic (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.

» **Mmakoena Mmola**, the principle author of this BA Report, holds a BSc Honours in Geochemistry from the University of the Witwatersrand and over 4 years of experience in the environmental management field. Her key focus is on undertaking environmental impact assessments, environmental permitting and authorisations, compliance auditing, public participation, and environmental management programmes. She is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), Registration Number: 126748 and an Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa, Number: 2019/260.

» **Jo-Anne Thomas**, the principle EAP on this project, is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726). She provides technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Her key focus is on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures.

» **Nicolene Venter**, is a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

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

Specialist	Area of Expertise
David Hoare of David Hoare Consulting (Pty) Ltd	Terrestrial Ecology (including fauna and flora)
Chris van Rooyen of Chris van Rooyen Consulting	Avifauna

Andrew Husted and Ivan Baker of the Biodiversity Company	Aquatic Ecology and Soil, Land Use, and Agricultural Potential
Lourens du Plessis of LoGIS	Visual
Tony Barbour of Tony Barbour Environmental Consulting	Social
Jenna Lavin of CTS Heritage	Heritage (including Archaeology Palaeontology and Cultural Heritage)

The CVs of the EIA Consulting Team are included in **Appendix A** and the EAP Declaration of Independence and Affirmation is included in **Appendix P**.

CHAPTER 2: PROJECT DESCRIPTION AND ALTERNATIVES

This chapter provides an overview of the Great Karoo EGI and details the project scope, which includes the planning/design, construction, operation and decommissioning activities required for the development. It also provides description of the preferred site location, activity and technology alternatives, and the 'do-nothing' option for the project.

2.1. 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(b) the location of the activity including (i) the 21digit 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 project 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 locality map illustrating the Great Karoo EGI is included as **Figure 1.1**.
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 project is included in **Table 2.1** and **Table 2.2**.
3(g) a motivation for the preferred site, activity and technology alternative	The identification and motivation for the preferred project site, the development footprint of the central collector substation within the project site and power line corridor, the proposed activity and the proposed technology is included in **sections 2.4.1** and **2.4.2**.
3(h)(i) details of the alternative considered	The details of all alternatives considered as part of the project is included in sections **2.4.1 – 2.4.4**. A summary of the alternative is also included in **section 2.4**.
3(h)(ix) the outcome of the site selection matrix	The site selection process followed by the developer in order to identify the Great Karoo EGI is described in **section 2.4.1**.
3(h)(x) if no alternatives, including alternative locations for the activity were investigation, the motivation for not considering such	Where no alternatives have been considered, motivation has been included in **section 2.4**.

2.2 Nature and extent of the Great Karoo EGI

Great Karoo Renewable Energy (Pty) Ltd is proposing the development of Electrical Grid Infrastructure (EGI) comprising a 132kV central collector substation and a 132kV double circuit power line near Richmond in the Northern Cape Province. A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality which forms part of the Central Karoo District in the Western Cape Province. The development of the Great Karoo EGI will enable the evacuation of electricity from two proposed Wind Farms and three proposed Solar PV Energy Facilities (which are collectively known as the Great Karoo Cluster of Renewable Energy Facilities) to the national grid at the existing Eskom Gamma Substation, located within the Western Cape Province. This infrastructure therefore serves as a grid connection solution for the development of five renewable energy facilities. One grid corridor has been considered for the assessment and placement of the 132kV double circuit power line.

2.2.1. Overview of the Project Site

The project is to be developed on a site located approximately 35km south-west of Richmond and 80km south-east of Victoria West, with a short section falling within the Western Cape Province where the line connects to the existing Eskom Gamma Substation. The project site falls within Ward 3 of the Ubuntu Local Municipality of the Pixley Ka Seme District Municipality in the Northern Cape Province and Ward 1 of the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province. The entire extent of the site is located within the Central Corridor of the Strategic Transmission Corridors. The central collector substation, which comprises both an Eskom portion and an IPP portion, is proposed on Portions 0 and 1 of the Farm Rondavel 85. The following affected properties are traversed by the grid corridor:

- Portion 0 of Farm Annex Rondavel 86
- Portion 1of Farm Uit Vlugt Fontein 265
- Portion 0 of Farm Wynandsfontein 91
- Portion 1 of Farm Wynandsfontein 91
- Portion 3 of Farm Vlekfontein 90
- Portion 0 of Farm Burgersfontein 92
- Portion 0 of Farm Nieuwe Fontein 89
- Portion 1 of Farm Nieuwe Fontein 89
- Portion 0 of Farm Rondavel 85
- Portion 1 of Farm Rondavel 85
- Portion 0 of Farm Kleinfontein 93
- Portion 1 of Farm Bult & Rietfontein 96
- Remaining Exent of Schietkuil 3

Access to the Great Karoo EGI site is ample with the presence of existing roads mainly consisting of national (i.e. the N1) and regional roads (i.e., the R63) (refer to **Figure 2.1**). A gravel main access road which bisects the grid corridor provides direct access to the EGI and will therefore be utilised for accessing the site (refer to **Figure 2.2**).

Figure 2.1: Location of the N1 national road in relation to the Great Karoo EGI

Figure 2.2: Location of the Great Karoo EGI in relation to the gravel main access road that bisects the project site and provides direct access to the EGI

2.2.2. Components of the Great Karoo EGI

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in **Table 2.1.**

Table 2.1: Details and dimensions of the planned infrastructure associated with the Great Karoo EGI

Infrastructure	Footprint and dimensions
Development footprint (permanent infrastructure area)	19.95ha
Capacity of the central collector substation	580MVA at 132kV
Corridor width (for assessment purposes)	One grid connection corridor has been identified for the assessment and placement of the grid connection infrastructure. The grid connection corridor is up to 1km wide and 37.5km long to allow for avoidance of environmental sensitivities, and suitable placement of the 132kV overhead power line within the corridor. Therefore, the entire corridor is being proposed for the development provided the infrastructure remains within the assessed corridor and environmental sensitivities are avoided.
Capacity and circuit of the power line	580MVA at 132kV (double circuit)
Power line servitude width	Up to 40m
Length of the grid connection corridor	Collector Sub – Gamma ~ 37.5km
Height of the power line towers (pylons)	Up to 41m
Access road	During construction, a permanent access road along the length of the power line corridor between 4 - 6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation.
A description and coordinates of the corridor in which the proposed activity or activities is to be undertaken Substation coordinates (approximate centre point and corner points)	**Central Collector Substation** **Great Karoo EGI** — **Lat** / **Long** **Centre Coordinates**: 31°28'21.93"S, 23°38'2.75"E **Corner Coordinates**: 31°28'13.91"S, 23°37'53.22"E 31°28'11.83"S, 23°38'20.01"E 31°28'28.91"S, 23°38'21.02"E 31°28'33.05"S, 23°37'33.58"E **Grid Corridor** **Point** / **Latitude** / **Longitude** Start Point: 31°27'54.54"S, 23°38'23.54"E Middle Point: 31°34'0.85"S, 23°29'35.40"E End Point: 31°42'0.68"S, 23°24'5.71"E

2.2.3 Project Development Phases associated with the Great Karoo EGI

Table 2.2: Details of the project development phases (i.e., construction, operation and decommissioning), applicable to all alternatives and infrastructure proposed

Construction Phase	
Requirements	» Duration of the construction phase is expected to be 12 -18 months. » Create direct construction employment opportunities. Approximately up to 50 employment opportunities will be created during the construction phase. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Richmond and Victoria West and transported to and from site on a daily basis. » Overnight on-site worker presence would be limited to security staff. » Waste removal and sanitation will be undertaken by a sub-contractor, where possible. Waste containers, including containers for hazardous waste, will be located at easily accessible locations on site when construction activities are undertaken. » Electricity required for construction activities will be generated by a generator. Where low voltage connections are possible, these will be considered. » Water required for the construction phase will be supplied by the municipality. In addition, where possible, borehole water will be used. Should water availability at the time of construction be limited, water will be transported to site via water tanks. Water will be used for sanitation and potable water on site as well as construction works.
Construction sequence	The following simplified sequence is conducted for the construction of the substation: » 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 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 (including quality control) and commissioning (in consultation with the switching specialist). Overhead power lines are constructed in the following simplified sequence: » Step 1: Surveying of the development corridor 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; obtain required environmental permits (such as biodiversity permits, heritage permits & WUL/GA);

	» 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 within and along the corridor; » Step 6: Stringing of conductors; » Step 7: Rehabilitation of disturbed areas; and » Step 8: Continued maintenance.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to a geotechnical survey, site survey (including the location of the central collection substation and power line servitude) and all other associated infrastructure. » Undertake search and rescue of flora and fauna species of concern (only where and if required) and the identification and excavation of any sites of cultural/heritage value (only where and if required) along the power line route and substation footprint.
Establishment of access roads	» An access road/track will be established along the power line servitude for construction and/or maintenance activities required. » Existing access roads will be utilised, where possible, to minimise impact. It is unlikely that access roads will need to be upgraded as part of the proposed development.
Undertake site preparation	» Including the clearance of vegetation at the pylon foundations and substation, trimming of vegetation along the final power line route (if required to ensure sufficient clearance between vegetation and the power line), establishment of the laydown areas, and excavations for foundations as well as the fencing of the switching station. » 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.
Establishment of laydown areas and batching plant on site	» A laydown area/s for the storage of grid infrastructure and substation 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 infrastructure foundations.
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.
Operation Phase	
» Duration will 20-25 years, or longer as needed for the operation of the renewable energy facilities. » Requirements for security and maintenance of the infrastructure. » Employment opportunities relating mainly to operation activities and maintenance. Very limited employment opportunities will be available. » Current land-use activities, i.e., livestock farming, can continue in the areas adjacent to the infrastructure.	

Activities to be undertaken	
Operation and Maintenance	» Ad hoc infrastructure maintenance activities. Once built, the power line and central collector substation will likely be ceded to Eskom, and it will be Eskom's full-time employees undertaking maintenance. » 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 the operation phase, vegetation around the central collector substation and within the power line servitude 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.
Decommissioning Phase	
Requirements	» Decommissioning of the grid connection infrastructure at the end of its economic life cycle and that of the renewable energy facilities for which it will facilitate the grid connection. » Expected lifespan of approximately 20 – 25 years (with maintenance) before decommissioning is required. » Decommissioning activities, if ultimately required, are 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 power line and central collector substation infrastructure components will be disassembled and reused and recycled (where possible). » Where components cannot be reused or recycled, these 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 of the project site affected by the infrastructure (development footprint) will revert back to their original land-use (i.e., primarily livestock farming) once the Great Karoo EGI has reached the end of its economic life and all infrastructure has been decommissioned.

2.3 Alternatives Considered during the BA Process

In accordance with the requirements of Appendix 1 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), reasonable and feasible alternatives, including but not limited to site and technology alternatives, as well as the "do-nothing" alternative should be considered.

The DFFE Guideline for determining alternatives states that the key criteria for consideration when identifying alternatives are that they should be "practicable", "feasible", "relevant", "reasonable" and "viable". Essentially there are two types of alternatives:

» Incrementally different (modifications) alternatives to the project.
» Fundamentally (totally) different alternatives to the project.

In this instance, 'the project' refers to the Great Karoo EGI, which is proposed to cater for five renewable energy facilities and enable grid connection for the evacuation of the electricity to the national grid.

2.3.1 Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level and, as a result, project-specific environmental impact assessments (including BA processes) are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the DMRE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP)[4], and will continue to be addressed as part of future revisions. In this regard, the need for renewable energy power generation from renewable energy facilities has been identified as part of the technology mix for power generation in the country for the next 20 years. The Great Karoo EGI will enable the evacuation of the generated electricity into the national grid for use and therefore supports the development of renewable energy projects.

The fundamental energy generation alternatives were assessed and considered within the development of the IRP and the need for the development of renewable energy projects (including the associated required grid connection solutions) has been defined. Therefore, fundamentally different alternatives to the proposed project are not considered within this BA process.

2.3.2 Consideration of Incrementally Different Alternatives

Incrementally different alternatives relate specifically to the project under investigation. "Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives for:

» The property on which, or location where the activity is proposed to be undertaken.
» The type of activity to be undertaken.
» The design or layout of the activity.
» The technology to be used in the activity.
» The operational aspects of the activity.

[4] The Integrated Resource Plan (IRP) is a legislated policy which regulates power generation planning.

In addition, the option of not implementing the activity (i.e., the "do-nothing" alternative) must also be considered.

The sections which follow describe the incrementally different alternatives being considered as part of the Great Karoo EGI project. Where no alternative is being considered, a motivation has been provided as required by the EIA Regulations, 2014, as amended.

2.4 Project Alternatives under Consideration for the Great Karoo EGI

An overview of the alternatives being considered as part of the project is provided below:

2.4.1 Location Alternatives

Great Karoo Renewable Energy (Pty) Ltd, as the proponent for the Great Karoo EGI, identified one technically feasible location for the central collector substation, and one grid connection corridor for consideration in the BA process. The grid connection corridor and footprint for the central collector substation are considered highly suitable from a technical perspective for development as they enable the connection of the renewable energy facilities to the national grid at the existing Eskom Gamma Substation. Specific characteristics considered in identifying a suitable grid connection corridor and a footprint for the central collector substation, and the results thereof, are discussed in the sections below.

- *Land Availability, Location and Land Use* – In order to develop the Great Karoo EGI, sufficient space and access to land between the central collector substation and the existing Eskom Gamma substation is required. The properties traversed by the grid connection corridor and within which the central collector substation is proposed are privately-owned parcels available in the area for a development of this nature through agreement with the landowners and are deemed technically feasible by the developer for such development to take place. The land use within the project site is mainly livestock farming, which is generally preferred for developments of this nature as farming activities can continue in tandem with the operation of the EGI. In addition, the footprint for the EGI is relatively minor in relation to the larger properties affected, and therefore does not conflict with the current grazing practices.

- *Geographical and Topographical Considerations* – The study area occurs on land that ranges in elevation from approximately 1 170m above sea level (in the south-western corner of the study area) to 1 830m (at the top of the mountains to the east). The terrain along the proposed grid corridor is predominantly flat with some hills and ridges occurring predominantly to the south of the grid corridor. Therefore, from a topographical perspective, there are very few physical constraints present which would have an effect on the construction of the proposed infrastructure. The entire project site is located within the Central Corridor of the Strategic Transmission Corridors and the development of the Great Karoo EGI is considered to be a strategic placement of supporting transmission and distribution infrastructure to enable renewable energy development and the evacuation of the generated power.

- *Existing Infrastructure* – The availability of existing road and grid connection infrastructure was considered by the developer in determining the location of the Great Karoo EGI as this will enable the use of infrastructure already available and reduce the disturbance associated with the construction of the associated infrastructure and connection to the grid. The existing road network within the surrounding areas and within the project site makes access to the development area possible, with the proximity of the project site to the N1 considered as highly beneficial.

The location of the renewable energy project site in proximity to the existing Gamma Substation was also considered. Critical in the selection process was that there is available capacity and connection points at the Gamma Substation to enable connection of the projects to the grid.

» *Consideration of sensitive environmental features* – The location of the central collector substation was informed by environmental sensitivities within the development area for the Merino Wind Farm (one of the renewable energy facilities that the Great Karoo EGI will provide a grid connection solution for) as determined through the EIA process undertaken for the facility. Through the assessment of the grid connection corridor of 1km in extent for the placement of the power line, which is much larger than the area required for the servitude of up to 40m, an opportunity is created by the proponent for the avoidance of sensitive environmental features and areas, thereby ensuring that the Great Karoo EGI may be placed appropriately without resulting in 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. In placing the 40m wide servitude for the Great Karoo EGI, consideration will also be given to landowner specific requirements as determined through the negotiation process.

2.4.2 Activity and Technology Alternatives

The construction and operation of a 132kV central collector substation and a 132kV double circuit power line) is linked to the grid connection infrastructure required to evacuate the generated renewable electricity from the five proposed renewable energy facilities. The activity is therefore specific to the technical requirements of the proposed renewable energy facilities. The development of the Great Karoo EGI is considered to be the most appropriate and efficient solution for the evacuation of the generated electricity from the five renewable energy facilities as it reduces the grid connection infrastructure required for each project and consolidates the required grid infrastructure to one area, thereby minimising the distribution of disturbance.

Based on the technical requirements and the opportunity to consolidate grid connection infrastructure for various renewable energy facilities, no activity or technology alternatives are proposed for consideration.

2.4.3 Design or Layout Alternatives

The design of the grid connection infrastructure is required to conform to Eskom's technical standards as it will form part of the national electricity supply network and must therefore be in-line with the existing network systems, technology, and infrastructure. As such, technical specifications as determined by Eskom will be adhered to by the proponent. Therefore, no design alternatives are possible or assessed within this BA Report.

This assessment considered the development of a 132kV central collector substation and a 132kV double circuit power line, connecting to the national grid via the existing Gamma Substation. Given that the location of the central collector substation was informed by environmental sensitivities within the development area for the Merino Wind Farm (which is one of the renewable energy facilities that the Great Karoo EGI will provide a grid connection solution for) as determined through the EIA process undertaken for the facility and is therefore deemed acceptable from an environmental perspective, no alternative locations are being considered for the development of the central collector substation within the project site.

One grid corridor, up to 1km in width and ~37.5 km in length, has been identified for assessment to allow for avoidance of environmental sensitivities as far as possible.

2.4.4 The 'do-nothing' Alternative

The 'do-nothing' alternative is the option of Great Karoo Renewable Energy (Pty) Ltd not constructing the Great Karoo EGI on the proposed site. This would result in no environmental or social impacts (positive or negative) as a result of the development of the Great Karoo EGI within the preferred project site. This alternative is assessed in detail within Chapter 7 of this BA Report.

CHAPTER 3: POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policy and legislative context within which the Great Karoo EGI is proposed. 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. It also provides information which supports the need and justification for the project, as discussed in Chapter 4.

Environmental legislation and associated permitting procedures relevant to the project are described and considered in Chapter 5 of this BA Report.

The Great Karoo EGI is regarded as essential infrastructure for the evacuation of electricity from the proposed five renewable energy facilities to the national grid. Therefore, the regulatory hierarchy, legislation, policies and plans from a national, provincial, and local level that are relevant for the development of the renewable energy facilities are directly linked to the development of the Great Karoo EGI.

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 Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(e) a description of the policy and legislative context within which the development is proposed including- (i) 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. (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.	A description of the policy and legislative context within which the Great Karoo EGI is proposed is included and considered within this chapter.

3.2 Strategic Electricity Planning in South Africa

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

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. As wind farm developments are a multi-sectoral issue (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process of a wind farm project and the related statutory environmental assessment process.

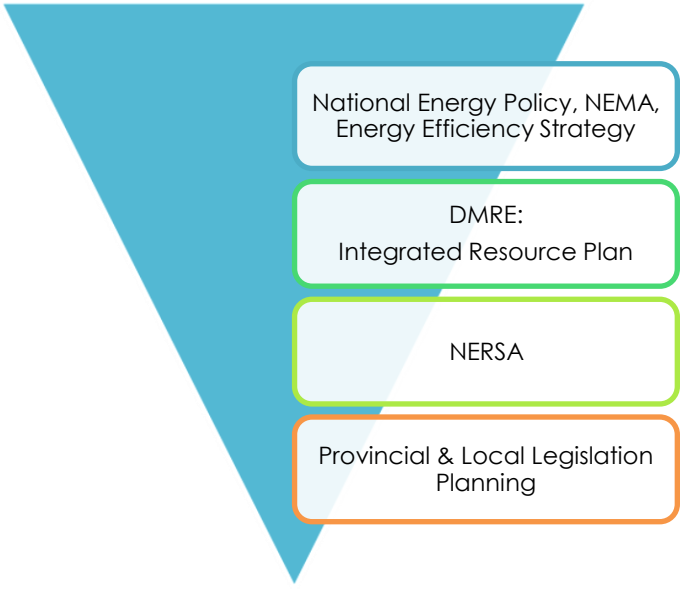


Figure 3.1: Hierarchy of electricity and planning documents

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

- **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity. Furthermore, the Department is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resources that may occur within the project site and development area.
- **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
- **Department of Forestry, Fisheries and the Environment (DFFE):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GN R326) as amended. DFFE is the Competent Authority for this project (as per GN R779 of 01 July 2016), and is charged with granting the EA for the project under consideration.
- **The 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.
- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resource management to ensure sustainable economic and social development. This Department

is also responsible for evaluating and issuing licenses pertaining to water use (i.e., Water Use License (WUL) and General Authorisation).

» **The Department of Agriculture, Rural Development and Land Reform (DARDLR):** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).

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

» **Provincial Government of the Northern Cape – Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR):** This Department is the commenting authority for the EIA process for the project and is responsible for issuing of biodiversity and conservation-related permits.
» **Northern Cape Department of Transport, Safety and Liaison:** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.
» **Ngwao-Boswa Ya Kapa Bokone (NBKB):** This Department identifies, conserves and manages heritage resources throughout the Northern Cape Province.
» **Western Cape – Department of Environmental Affairs and Development Planning (DEA&DP):** This Department is the commenting authority for the BA process for the project and is responsible for issuing of other biodiversity and conservation-related permits.
» **Western Cape Department of Transport and Public Works:** This department is responsible for Provincial roads within the Western Cape, and for the granting of exemption permits for the conveyance of abnormal loads on public roads.
» **CapeNature:** Their involvement relates specifically to the biodiversity and ecological aspects of proposed development activities on the receiving environment of the project site to ensure that developments do not compromise the biodiversity value of an area. CapeNature considers the significance of impacts specifically in threatened ecosystems as identified by the National Spatial Biodiversity Assessment or systematic biodiversity plans.
» **Western Cape Department of Agriculture:** This Department's involvement relates specifically to sustainable agricultural resource management and land care.
» **Heritage Western Cape (HWC)**: The provincial heritage resources authority within the Western Cape. This public entity seeks to identify, protect, and conserve the heritage resources of the Western Cape. HWC is mandated to promote co-operative governance between national, provincial, and local authorities for the identification, conservation, and management of heritage resources.

At the **Local Level,** the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In both the Northern Cape and Western Cape provinces, both the local and district municipalities play a role. In the Northern Cape, the local municipality includes the **Ubuntu Local Municipality** which forms part of the **Pixley Ka Seme District Municipality** and in the Western Cape, the local municipality includes the **Beaufort West Local Municipality** which forms part of the **Cenral Karoo District**.

In terms of the Municipal Systems 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.

3.3 International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of the Great Karoo EGI (and the renewable energy facilities it will cater for) are provided below in **Table 3.1**. The Great Karoo EGI is considered to be aligned with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 3.1: International policies relevant to the Great Karoo EGI

Relevant policy	Relevance to the Great Karoo EGI
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	The Conference of the Parties (COP), established by Article 7 of the UNFCCC, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention. The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The 26th COP was held in Glasgow from 31 October to 12 November 2021. From this conference, 137 countries made a commitment to "alt and reverse forest loss and land degradation" by 2030. Phasing out the use of coal for energy production was a key objective for the UK presidency. 190 countries agreed to phase down coal power, resulting in a 76% decrease in planned new coal power plants. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for the five proposed renewable energy facilities that the Great Karoo EGI will cater for which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.
The Equator Principles IV (October 2020)	The Equator Principles (EPs) IV constitute a financial industry benchmark used for determining, assessing, and managing 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 (such as the proposed Great Karoo cluster of renewable energy facilities and the proposed Great Karoo EGI) and apply globally to all industry sectors.

Relevant policy	Relevance to the Great Karoo EGI
	Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the project. 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 Great Karoo EGI (and the five proposed renewable energy facilities associated with the project) is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended (GN R706), 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 and Environmental and Social Sustainability (January 2012)	The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012. Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an Environmental and Social Management System (ESMS) appropriate to the nature and scale of the project, and commensurate with the level of its environmental and social risks and impacts, be established and maintained. The above-mentioned standard is the overarching standard to which all the other standards relate. Performance Standards 2 through to 8 establish specific requirements to avoid, reduce, mitigate, or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS consistent with Performance Standard 1. Given the nature of the Great Karoo EGI, it is anticipated (at this stage of the process) that Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project.

3.4 National Policy and Planning Context

A brief review of the most relevant national policies is provided below in **Table 3.2**. The development of Great Karoo EGI is considered to align with the aims of these policies, even where contributions to achieving the goals therein are only minor.

Table 3.2: Relevant national legislation and policies for the Great Karoo EGI

Relevant legislation or policy	Relevance to the Great Karoo EGI
Constitution of the Republic of South Africa, 1996	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

Relevant legislation or policy	Relevance to the Great Karoo EGI
	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. The undertaking of an EIA process for the proposed project in terms of the requirements of the EIA Regulations, 2014 (as amended) aims to minimise any impacts on the natural and social environment.
National Environmental Management Act (No. 107 of 1998) (NEMA)	The NEMA is South Africa's key piece of environmental legislation and sets the framework for environmental management in South Africa. The 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 state that the social, economic, and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed, and 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 the NEMA.
National Energy Act (No. 34 of 2008)	The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking into account environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The National Energy Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and carriers, adequate investment in, appropriate upkeep and access to energy infrastructure. The Act provides measures for the furnishing of certain data and information regarding energy demand, supply, and generation, and for establishing an institution to be responsible for promotion of efficient generation and consumption of energy and energy research. The Act provides the legal framework which supports the development of power generation facilities, and the required associated grid infrastructure, such as the Great Karoo EGI.
White Paper on the Energy Policy of the Republic of South Africa (1998)	The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of renewable energy and encouraging new entries into the generation market. The policy states that the advantages of renewable energy include, minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include higher capital costs in some cases, lower energy densities, and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate from an

Relevant legislation or policy	Relevance to the Great Karoo EGI
	unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	The White Paper on Renewable Energy Policy supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of renewable energy and aims to create the necessary conditions for the development and commercial implementation of renewable energy technologies. The White Paper on Renewable Energy sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing renewable energy in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and fairly accessible and affordable coal resources. However, massive renewable energy resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The development of additional renewable energy projects 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 Electricity Regulation Act (No. of 2006)	The Electricity Regulation Act of 2006 replaced the Electricity Act (No. 41 of 1987), as amended, with the exception of Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator (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 the generation, transmission, distribution, trading, and import and export of electricity are regulated.
National Development Plan 2030	The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes: » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system will look very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role. The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of the five

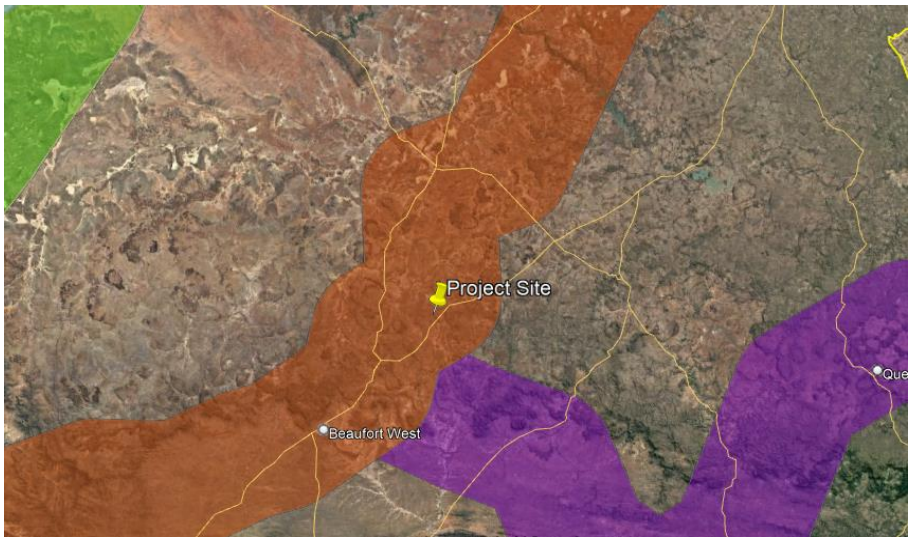
Relevant legislation or policy	Relevance to the Great Karoo EGI
	renewable energy facilities which the Great Karoo EGI will serve as a grid connection solution for supports the NDP through the development of energy-generating infrastructure which will not lead to the generation of GHGs and will result in economic development and growth of the area surrounding the development area.
Integrated Energy Plan (IEP), November 2016	The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include: » To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector. » To guide the selection of appropriate technologies to meet energy demand (i.e., the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels). » To guide investment in and the development of energy infrastructure in South Africa. » To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors. A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to take into account changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others. The 8 key objectives of the integrated energy planning process are as follows: » Objective 1: Ensure security of supply. » Objective 2: Minimise the cost of energy. » Objective 3: Promote the creation of jobs and localisation. » Objective 4: Minimise negative environmental impacts from the energy sector. » Objective 5: Promote the conservation of water. » Objective 6: Diversify supply sources and primary sources of energy. » Objective 7: Promote energy efficiency in the economy. » Objective 8: Increase access to modern energy.
Integrated Resource Plan for Electricity (IRP) 2010-2030	The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing, and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation. On 27 August 2018, the then Minister of Energy published a draft IRP which was issued for public comment. The lengthy public participation and consultation process has culminated in the issue of the overdue IRP 2019 which updates the energy forecast from the current period to the year 2030.

Relevant legislation or policy	Relevance to the Great Karoo EGI
	According to the IPP Procurement Programme overview report, as of 31 March 2021, the REIPPP Programme had made the following significant impacts in terms of energy supply: » 6 442MW of electricity had been procured from 112 Renewable Energy Independent Power Producers (IPPs) in seven bid rounds[5]. » 5 078MW of electricity generation capacity from 79 IPP proejcts has been connected to the national grid. » 59 761GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational in November 2013. Renewable energy IPPs have proved to be very reliable. Of the 79 projects that have started operations, 67 projects have bene operational for longer than a year. The electrical energy generated over the past 12-month period for the 67 projects is 11 679GWh, which is 94% of their annual energy contribution projections of 12 481GWh over a 12-month delivery period. Twenty-six (26) of the 67 projects (39%) have individually exceeded their projections. In August 2021, Bid Window 5, which had aimed to sign up 2 600MW of power, including 1 600MW of wind and 1 000MW of solar was open. It attracted 102 bids, offering capacity of 9 644MW. The amount from the 25 chosen bids was 2 583MW.
New Growth Path (NGP) Framework, 23 November 2010	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 by 2020; with economic growth and employment creation as the key indicators identified in the NGP. The framework seeks to identify key structural changes in the economy that can improve performance in terms of labour absorption and the composition and rate of growth. 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.
National Climate Change Bill, 2018	On 08 June 2018, the Minister of Environmental Affairs published the National Climate Change Bill ("the Bill") for public comment. 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 development of the five proposed renewable energy facilities and the evacuation of the electricity (through the Great Karoo EGI) would not result in the generation or release of emissions during its operation.
National Climate Change Response Policy, 2011	South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms

[5] Bid windows1, 2 ,3 ,3.5 ,4 and small BW1(1S2) and small BW2(2S2).

Relevant legislation or policy	Relevance to the Great Karoo EGI
	thereafter, and based on this, the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. As an integral part of the policy, a set of near-term priority flagship programmes will be implemented to address the challenges of climate change, one of which includes the Renewable Energy Flagship Programme. This flagship programme includes a scaled-up renewable energy programme, based on the current programme specified in the IRP 2010, and using the evolving South African Renewables Initiative led by the Department of Public Enterprise and Department of Trade and Industry (DTI), as a driver for the deployment of renewable energy technologies. The programme will be informed by enhanced domestic manufacturing potential and the implementation of energy efficiency and renewable energy plans by local government. The development of the proposed five renewable energy facilities, and the required associated EGI, is aligned with the Renewable Energy Flagship Programme identified under South Africa's NCCRP and could therefore be argued to be aligned with the country's approach to addressing climate change.
National Climate Change Response Strategy for South Africa, 2004	The need for a national climate change policy for South Africa was identified as an urgent requirement during the preparations for the ratification of the UNFCCC in 1997. A process to develop such a policy was thus instituted under the auspices of the National Committee for Climate Change (NCCC), a non-statutory stakeholder body set up in 1994 to advise the Minister on climate change issues and chaired by the then Department of Environmental Affairs and Tourism (DEAT). It was determined that a national climate change response strategy will promote integration between the programmes of the various government departments involved to maximise the benefits to the country as a whole, while minimising negative impacts. Further, as climate change response actions can potentially act as a significant factor in boosting sustainable economic and social development, a national strategy specifically designed to bring this about is clearly in the national interest, supporting the major objectives of the government, including poverty alleviation and the creation of jobs. A number of principles and factors guided the conception of the strategy and are required to be implemented. These are: » Ensuring that the strategy is consistent with national priorities, including poverty alleviation, access to basic amenities including infrastructure development, job creation, rural development, foreign investment, human resource development and improved health, leading to sustainable economic growth. » Ensuring alignment with the need to consistently use locally available resources. » Ensuring compliance with international obligations. » Recognizing that climate change is a cross cutting issue that demands integration across the work programmes of other departments and stakeholders, and across many sectors of industry, business, and the community. » Focussing on those areas that promote sustainable development. » Promoting programmes that will build capacity, raise awareness, and improve education in climate change issues. » Encouraging programmes that will harness existing national technological competencies. » Reviewing the strategy constantly in the light of national priorities and international trends.

Relevant legislation or policy	Relevance to the Great Karoo EGI
	» Recognizing that South Africa's emissions will continue to increase as development is realised. The strategy was devised through an integrated approach and considers policies and programmes of other government departments and the fact that South Africa is a developing country. This will ensure that the principles of sustainable development are adequately served and do not conflict with existing development policies.
Climate Change Bill	The purpose of this Bill is to enable the development of an effective climate change response and a long-term, just transition to a low-carbon and climate-resilient economy and society for South Africa in the context of sustainable development; and to provide for matters connected therewith. The Bill acknowledges that anthropogenic climate change represents an urgent threat to human societies and the environment, and requires an effective, progressive and well-coordinated response. It further highlights that, amongst others, anticipated domestic climate change impacts have the potential to undermine the country's development goals, and that responses to climate change raise unique challenges, thus requiring a legislative framework for the implementation of the country's national climate change response. The National Climate Change Bills addresses issues related institutional and coordination arrangement across the three spheres of government namely national, provincial and local. It further highlights the need the spheres of government and entities, sectors as well business to respond to challenges of climate change. The bill further address the matters relating to, the national adaptation to impacts of climate change, greenhouse gas emissions and removals, and policy alignment and institutional arrangements. The objects of the proposed Act are to: » Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance; » Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response; and to » Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner. The Bill was introduced to Parliament by the Minister of Forestry, Fisheries and the Environment on 18 February 2022.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of

Relevant legislation or policy	Relevance to the Great Karoo EGI
	African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the renewable energy facilities, while SIP 10 supports the development of the Great Karoo EGI: » SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities. » SIP 9: Electricity generation to support socio-economic development: The proposed six renewable energy facilities are a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. » SIP10: Electricity transmission and distribution for all: the development of the Great Karoo EGI will enable the evacuation of renewable energy to the national grid.
Strategic Transmission Corridors (GNR 113 of February 2018)	The Strategic Environmental Assessment for Electricity Grid Infrastructure has identified five Strategic Transmission Corridors that are of strategic importance for large-scale electricity transmission and distribution infrastructure, in terms of Strategic Integrated Project (SIP) 10: Electricity Transmission and Distribution. The Great Karoo EGI is located within the Central Strategic Transmission Corridor (**Figure 3.2.**).  **Figure 3.2:** Location of the project site within the Central Strategic Transmission corridor (shown in brown)

3.5 Provincial Policy and Planning Context

A brief review of the most relevant provincial policies is provided below in **Table 3.3**. The development of Great Karoo EGI is considered to align with the aims of these policies, even where contributions to achieving the goals therein are only minor.

Table 3.3: Relevant provincial legislation and policies for the Great Karoo EGI

Relevant policy	Relevance to the Great Karoo EGI
Northern Cape Provincial Spatial Development Framework (PSDF) 2012	The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the province is to enable sustainability through sustainable development. The province considers social and economic development as imperative in order to address the most significant challenge facing the Northern Cape, which is poverty. The PSDF identifies key sectoral strategies and plans which are considered to be the key components of the PSDF. Sectoral Strategy 19 refers to a provincial renewable energy strategy. Within the PSDF, a policy has been included which states that renewable energy sources (including the utilisation of solar energy) are to comprise 25% of the province's energy generation capacity by 2020. 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. The development of the Great Karoo EGI for the evacuation of the renewable energy falls within the overall energy objective for the province.
Northern Cape Provincial Spatial Development Framework (PSDF) 2018 Review - Executive Summary	The review of the Northern Cape PSDF (2018) refers to infrastructure investment and that a balance must be maintained between investments aimed at meeting the social needs of communities and investments aimed at promoting economic development and job creation. The Spatial Development Strategy identified in the PSDF for basic infrastructure includes achieving the provision of green infrastructure which includes renewable energy. As part of the Vision 2040 of the PSDF, key opportunities are identified for the province. The strengthening of the development triangle that is formed by the linking of Kimberley, Vryburg, Upington and De Aar. The development triangle sustains a diverse economy with strong mining, agricultural and renewable energy sectors. It is stated in the PSDF that a sustainable and viable economic network must be driven within the development triangle to improve the return of public investment in the province. The development of the Great Karoo EGI and the renewable energy facilities it will cater for will contribute to the economic network of the province specifically in terms of the renewable sector, albeit it does not fall within the development triangle.
Northern Cape Provincial Growth and Development Strategy	The Northern Cape Provincial Growth and Development Strategy (NCPGDS) identifies poverty reduction as the most significant challenge facing the government and its partners. All other societal challenges that the province faces emanate predominantly from the effects of poverty. The NCPGDS notes that the only effective way to reduce poverty is through long-term sustainable economic growth and development. The sectors where economic growth and development can be promoted include: » Agriculture and Agro-processing. » Fishing and Mariculture.

Relevant policy	Relevance to the Great Karoo EGI
	» Mining and mineral processing. » Transport. » Manufacturing. » Tourism. However, the NCPGDS also notes that economic development in these sectors also requires: » Creating opportunities for lifelong learning. » Improving the skills of the labour force to increase productivity. » Increasing accessibility to knowledge and information. The achievement of these primary development objectives depends on the achievement of a number of related objectives that, at a macro-level, describe necessary conditions for growth and development. These are: » Developing requisite levels of human and social capital. » Improving the efficiency and effectiveness of governance and other development institutions. » Enhancing infrastructure for economic growth and social development. The NCPGDS makes reference to the need to ensure the availability of inexpensive energy. The section notes that in order to promote economic growth in the Northern Cape, the availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes "the development of energy sources such as solar energy, the natural gas fields, bio-fuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape". The NCPGDS also highlights the importance of close co-operation between the public and private sectors in order for the economic development potential of the Northern Cape to be realised. The NCPGDS also highlights the importance of enterprise development and notes that the current level of private sector development and investment in the Northern Cape are low. In addition, the province also lags in the key policy priority areas of SMME Development and Black Economic Empowerment. The development of the Great Karoo EGI therefore has the potential to create employment opportunities, promote skills development, create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province.
The Northern Cape Climate Change Response Strategy	The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "*The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key. Sectors to ensure proactive long-term responses to the frequency and intensity of extreme weather*

Relevant policy	Relevance to the Great Karoo EGI
	events such as flooding and wildfire, with heightened requirements for effective disaster management". Key points from the MEC address include the NCPG's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the Northern Cape Province's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. Since the Great Karoo EGI will serve as a grid connection solution for the proposed Great Karoo cluster of renewable energy facilities, development of the Great Karoo EGI will indirectly assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape.
Northern Cape Province Green Document	The NCP Green Document (2017-2018) was prepared by the Northern Cape Department of Economic Development and Tourism and provides an impact assessment of IPPs on the communities in the province located within a 50km radius from existing facilities. The document notes that the NCP is nationally a leader in commercial-scale renewable energy projects. By 2018, a total of 23 IPP projects in the province had been integrated into the national grid. These projects include Solar PV, Concentrated Solar, and Wind Energy Facilities. The document notes that through their economic development obligations, these projects have already made a significant positive contribution to affected communities. Much of the effort has been directed at supporting local education. The document also notes that, as these projects are committed to 20-year minimum lifespans, they collectively hold a tremendous potential for socio-economic upliftment. The development of the Great Karoo EGI will contribute towards further socio-economic upliftment in the Northern Cape Province.
Northern Cape Critical Biodiversity Area (CBA) Map (2016)	The Northern Cape Critical Biodiversity Area (CBA) Map was published in 2016 and updates, revises and replaces all older systematic biodiversity plans and associated products for the province. The Northern Cape CBA map classifies the natural vegetation of the province according to conservation value in decreasing value, as follows: » Protected » Critical Biodiversity Area One (Irreplaceable Areas) » Critical Biodiversity Area Two (Important Areas) » Ecological Support Area » Other Natural Area At a regional level, the Critical Biodiversity Area (CBA) map for the Northern Cape indicates the northern part of the broader project site as being important for conservation. There are also two drainage lines (the two main ones on site) that are designated as being CBA1 areas. The remaining drainage lines of the broader project site are indicated as being Ecological Support Areas (ESAs).

Relevant policy	Relevance to the Great Karoo EGI
	The project site overlaps with predominantly Other Natural Areas (ONA). Some sections of CBA One (CBA 1) and an ESA area are traversed by the grid corridors.
Western Cape Climate Change Response Strategy	The Western Cape Climate Change Response Strategy (WCCCRS) was adopted in February 2014. It is an update of the 2008 Western Cape Climate Change Response Strategy and Action Plan. The key difference with the 2008 Strategy is a greater emphasis on mitigation, including strategically suitable renewable energy development. The 2014 WCCCRS was updated in accordance with the National Climate Change Response Policy (2013). It is strongly aligned with the overarching provincial objectives contained in the Western Cape Draft Strategic Plan 2009-2014 (2010), and the WCP 'Green is Smart' Strategy (2013). In line with the National Climate Change Response Policy, the Strategy takes a two-pronged approach to addressing climate change: » **Mitigation:** Contribute to national and global efforts to significantly reduce Green House Gas (GHG) emissions and build a sustainable low carbon economy, which simultaneously addresses the need for economic growth, job creation and improving socio-economic conditions. » **Adaptation:** Reduce climate vulnerability and develop the adaptive capacity of the Western Cape's economy, its people, its ecosystems and its critical infrastructure in a manner that simultaneously addresses the province's socio-economic and environmental goals (WCCCRS, 2014: 21). The Strategy will be executed through an implementation framework which will include an institutional framework for both internal and external stakeholders, with a strong emphasis on partnerships. The framework still has to be prepared. A monitoring and evaluation system is further envisaged in order to track the transition to a low carbon and climate resilient WCP. Policy aspects dealing with mitigation are of specific relevance to renewable energy generation. Initial implementation of the Strategy will focus on select focus areas aligned with the National Climate Change Response Policy Flagship Programmes and the Western Cape Green Economy Strategy Framework. These focus areas will be reviewed every five years – i.e., the next revision is due in 2019. Renewable area is identified as one of eleven focus areas. The Strategy document notes that renewable energy is a key area of focus for the Western Cape and forms a fundamental component of the drive towards the Western Cape becoming the green economy hub for Africa. The role of provincial government is identified as 'supporting the development of the renewable energy industry through promoting the placement of renewable energy facilities in strategic areas of the Western Cape as well as through supporting renewable energy industries. The document further notes that waste-to-energy opportunities are being investigated in order to facilitate large-scale rollout. Current investigation includes understanding the most appropriate technologies for waste-to-energy projects as well as developing decision support tools for municipalities to implement waste-to-energy programmes). The development of grid connection infrastructure will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the

Relevant policy	Relevance to the Great Karoo EGI
	Western Cape through the evacuation of generated power from the Great Karoo Cluster of Renewable Energy Facilities to the national grid.
White Paper on Sustainable Energy for the Western Cape (2010)	The White Paper on Sustainable Energy (2010) compliments the Climate Change Strategy and Action Plan, specifically by *inter alia* setting targets for renewable energy generation. The White Paper is currently in Final Draft form. Once approved by Provincial cabinet, it will constitute the formal Western Cape's policy document on which the Western Cape Sustainable Energy Facilitation Bill will be based. The purpose of the White Paper and the envisaged Bill is to create an enabling policy environment in the Western Cape to promote and facilitate energy generation from renewable sources, as well as efficient energy use technologies and initiatives. This objective forms an integrated part of the Province's overarching energy policy objectives, namely: » To ensure medium-term energy security, sufficient to support economic growth. » To reduce energy poverty. » To increase the efficient use of energy. » To limit the greenhouse emissions footprint (associated with the use of fossil fuels). » To decrease reliance on finite fossil fuel resources and associated unpredictable commodity markets. The White Paper forms part of the Provincial Government of the Western Cape's (PGWC) strategy to aimed at removing a number of barriers (e.g., energy pricing, legal, institutional, low levels of investment confidence, insufficient knowledge) currently frustrating the province's energy goals by preventing the adoption and commercialization of clean energy (including electricity generation from renewable sources such as wind and solar) technologies and initiatives. The White Paper notes that, with regard to sources of renewable energy, wind and solar both represent commercially viable options in the province. The document proposes that special focus should be given to these renewables' subsectors and specific associated technologies in particular in order to achieve critical mass of installation, and thus drive down establishment costs and ensure permanent employment opportunities. The context, vision, identified goals and targets of the White Paper are briefly discussed below: ***Context*** The White Paper is rooted in an integrated set of high-level provincial policy documents, and in particular, the Western Cape Provincial Growth and Development Strategy (PGDS)[6] of 2007 and the Sustainable Development Implementation Plan (SDIP)[7]. These policy documents provide the overarching framework for the White Paper. Information contained in the internal Sustainable Energy Strategy (SES) document, which was prepared in 2007, largely informed the drafting of the White Paper.

[6] The main purpose of the PGDS is to provide a strategic framework for accelerated and shared economic growth in the Western Cape. The PGDS builds on the 12 iKapa strategies which were developed by the relevant PGWC line departments, including the Provincial Spatial Development Framework (PSDF), the Sustainable Development Implementation Plan (SDIP) and the Climate Change Response Strategy (CCRS).

[7] This plan includes programmes to encourage biodiversity, effective open-space management and the better management of settlements by ensuring the sustainability of services in respect of water, waste, energy and land. The SES and White Paper both effectively form part of SDIP.

Relevant policy	Relevance to the Great Karoo EGI
	Vision The vision underpinning the White Paper, the so-called "2014 Sustainable Energy Vision for the Western Cape" is the following: *The Western Cape has a secure supply of quality, reliable, clean and safe energy, which delivers social, economic and environmental benefits to the Province's citizens, while also addressing the climate change challenges facing the region and the eradication of energy poverty* (White Paper, 15). ***Goals*** Six goals have been identified in order to realise to this vision. These goals are grouped under economic, environmental and social sustainability categories. These goals are listed below, and each briefly discussed: » Goal 1: alleviate energy poverty (Social sustainability): This goal is aimed at addressing energy-related under-development amongst the province's poor. » Goal 2: Improve the health of the nation (Social sustainability): The goal is aimed at reducing health and safety risks associated with the use of fuels such as coal, paraffin, and wood, as well as the generation of electricity from fossil fuels. In this regard it is noted that use of renewable sources to generate electricity does not emit harmful substances such as smoke, or oxides of sulphur nitrogen into the atmosphere. The document notes that improving the health of the nation includes improving the health of the individual through improved indoor climate as well as the outdoor climate. » Goal 3: Reduce harmful emissions (Environmental sustainability): The White Paper notes that improved energy efficiency and increased use of renewable energy are cost effective methods to reduce Greenhouse Gas emissions, thereby combating Climate Change. Addressing Climate Change opens the door to utilizing additional finance mechanisms to reduce CO_2 emissions. » Goal 4: Reduce negative footprints in our environment (Environmental sustainability): The White Paper notes that the use of fossil fuels has a documented negative impact on the regional and local environment. The negative impact includes but is not limited to individual health, ground water pollution and air pollution. Any reduction in the use of fossil fuels through switching to clean(er) energy sources and more efficient energy uses is therefore desirable. » Goal 5: Enhance energy security (Economic sustainability): The massive South African blackouts that started first in the Western Cape in early 2006 alerted the Province to its energy vulnerability. It is essential that the Western Cape increases its resilience against external energy supply disruptions and the massive price fluctuations caused by national or international decisions about energy commodities (coal, oil). » Goal 6: Improve economic competitiveness (Economic sustainability): It has been demonstrated internationally that one of the ways to improve economic competitiveness is by improving industrial and commercial energy efficiency. Support of industrial best practice energy management as a tool to stay competitive and improve the economy is important. ***Targets*** The PGWC agreed to targets for electricity from renewable sources and for energy efficiency to be achieved by 2014. The purpose of the White Paper is to quantify the

Relevant policy	Relevance to the Great Karoo EGI
	relevant targets, and further to provide an incremental implementation plan until 2014. In this regard, four targets have been identified. Of these, two are of direct relevance to the proposed Compton PV SEF and associated EGI: » Target for electricity generated from renewable sources: *15% of the electricity consumed in the Western Cape will come from renewable energy sources in 2014, measured against the 2006 provincial electricity consumption* (White Paper, 21). In this regard, the White Paper notes that in order to reach this target, it will be necessary for the PGWC to ensure that the environment to establish and generate renewable energy is such that a minimum of 15% of the electricity can be produced, and must be consumed, from renewable sources. » Target for reducing carbon emissions: *The carbon emissions are reduced by 10% by 2014 measured against the 2000 emission levels* (p. 23). In this regard, the White Paper notes that achieving this target largely depends on achieving the renewables target. ***Applicability*** The White Paper remains the most recent document in this regard. It was adopted by Provincial Cabinet in 2010. By 2011 DEA&DP had finalized a Draft Western Cape Sustainable Energy Bill[8]. However, in MEC Bredell's Departmental Oversight Report to WC Parliament in November 2013, he indicated that further drafting of the Bill has been suspended, as the process had been overtaken by developments in national legislation[9].
Western Cape Provincial Strategic Plan (WCPSP) (2019-2024)	The strategic plan identifies five strategic goals for the 2019-2024 period which includes building safe communities; boosting the economy and job creation; empowering people; promoting mobility and spatial transformation and driving innovation. The development of Great EGI and the cluster of renewable energy facilities that it will cater for will assist the Western Cape provincial government with achieving some of the five strategic goals (even if only to a limited extent) and is therefore considered as a desired development within the Province. In terms of Focus Area 5: Creating an enabling environment for economic growth through resource resilience, the Western Cape Government has indicated that it will respond to and mitigate the challenges and impacts of climate change and improve the resource resilience of the economy through Energy Security. According to the plan, the Western Cape Government will continue to drive initiatives that support the Green Economy, such as smart grids, large-scale rooftop PV systems, and green infrastructure. Support will be provided to procure power from IPPs, once this is legally possible, with national engagements remaining a priority. The growth of the renewable energy sector has the potential for high labour absorption and can also link to increased opportunities for SMMEs, especially for SSEG.
Western Cape Provincial Spatial Development Framework (PSDF) (2014)	The PSDF is based on a set of 5 guiding principles, namely: » Spatial justice.

[8] www.gov.za/department-environmental-affairs-and-development-planning-2011-budget-speech-delivered-western-cape.

[9] Parliament of the Province of the Western Cape - Announcements, Tablings and Committee Reports (2013) F*riday, 15 November 2013,* 202 No 69 – 2013, Fifth session, Fourth Parliament, Item B.1.b (x).

Relevant policy	Relevance to the Great Karoo EGI
	» Sustainability and resilience. » Spatial efficiency. » Accessibility. » Quality and Livability. Under Sustainability and resilience, the PSDF notes that land development should be spatially compact, resource-frugal, compatible with cultural and scenic landscapes, and should not involve the conversion of high potential agricultural land or compromise ecosystems (p. 22). The 2004 Growth Potential Study was also revised in 2013 as part of the PSDF process[10]. Key spatial challenges are outlined in Chapter 2 of the PSDF. Energy security and climate change response are identified as key high-level future risk factors. The PSDF notes that the WCP is subject to global environmental risks such as climate change, depletion of material resources, anticipated changes to the global carbon regulatory environment, and food and water insecurity. The challenge would be to open up opportunities for inclusive economic growth and decouple economic growth from resource consumptive activities (i.e., the development of a 'greener' economy, as outlined in the 2013 WCP Green is Smart strategy – see further below). In this regard, the 2014 PSDF is in response to a number of associated escalating risks, including understanding the spatial implications of known risks (e.g., climate change and its economic impact and sea level rise, flooding and wind damage associated with extreme climatic events); and energy insecurity, high levels of carbon emissions, and the economic impacts of the introduction of a carbon tax (p. 27). The spatial agenda for the WCP is set out in Chapter 2.6. This agenda is anticipated to deliver on the objectives of greater inclusivity, growth and environmental resilience. The agenda may be summarized as three linked sub-agendas, all addressed in the PSDF: » Growing the WCP economy in partnership with the private sector, non-governmental and community-based organisations. » Using infrastructure investment as primary lever to bring about the required urban and rural spatial transitions, including transitioning to sustainable technologies, as set out in the 2013 Western Cape Infrastructure Framework (WCIF), while also maintaining existing infrastructure. » Improving oversight of the sustainable use of the Western Cape's spatial assets. This sub-agendum is of specific relevance to climate change response and renewable energy. Its key objective is safeguarding the biodiversity networks, ecosystem services, agricultural resources, soils, and water, as well as the WCP's unique cultural, scenic and coastal resources on which the tourism economy depends. In addition, it seeks to understand the spatial implications of known risks (e.g., climate change) and to introduce risk mitigation and/or adaptation measures. Chapter 3.1 deals with the sustainable use of the WCP's assets. These are identified as Biodiversity and Ecosystem services; Water resources; Soils and Mineral resources;

[10] eadp-westerncape.kznsshf.gov.za/sites/default/files/news/files/2013-10-15/2013-growth-potential-study-of-towns-report_0.pdf. The 2014 PSDF is informed by three additional studies, also available at the above link.

Relevant policy	Relevance to the Great Karoo EGI
	Resource consumption and disposal; and Landscape and scenic assets. Policies are outlined for each of these themed assets. The last two themed assets are of specific relevance with regard to renewable energy. Key challenges facing the WCP are identified as matters pertaining to waste disposal, air quality, energy, and climate change. ***Energy*** With regard to energy use, the PSDF notes that the Cape Metro (albeit the province's most efficient user) and West Coast regions are the WCP's main energy users. It further notes that the WCP's electricity is primarily drawn from the national grid, which is dominated by coal-based power stations, and that the WCP currently has a small emergent renewable energy sector in the form of wind and solar generation facilities located in its more rural, sparsely populated areas. The PSDF also reiterates PGWC's commitment to shifting the economy towards gas[11] as transitional fuel (see WCIP below). Most of the energy discussion in the PSDF is dominated by aspects pertaining to natural gas. With regard to renewable energy, the following policy provisions are of relevance: » Policy R.4.6: Pursue energy diversification and energy efficiency in order for the Western Cape to transition to a low carbon, sustainable energy future, and delink economic growth from energy use. » R.4.7: Support emergent Independent Power Producers (IPPs) and sustainable energy producers (wind, solar, *biomass and waste conversion initiatives) in suitable rural locations (as per recommendations of the Strategic Environmental Assessments for wind energy (DEA&DP) and renewable energy (DEA)*. Unlike the 2009 PSDF, the new PSDF does not provide any spatial provisions with regard to REF or transmission line infrastructure. Instead, such determination is envisaged in terms of the WCP WEF SEA, the DEA REF SEA, municipal SDFs, etc. In this regard the two policy directives contained in the 2009 PSDF that had a direct relevance for SEFs are not contained in the 2014 revision, namely: » *HR26 (…) transmission lines (…) should be aligned along existing and proposed transport corridors rather than along point-to-point cross-country routes.* (Mandatory directive). » *HR27 Wind farms should be located where they will cause least visual impact, taking into consideration the viability of the project.* (Guiding directive)[12] ***Climate change*** Water scarcity is identified as probably the key risk associated with climate change. Essentially the same primary response objectives outlined in the 2014 Western Cape Climate Change Response Strategy (WCCCRS) are identified in the PSDF. These are energy efficiency, demand management and renewable energy.

[11] The PSDF at present envisages mainly from offshore West Coast gas fields via a terminal at Saldanha. The PSDF refers to the potential exploitation of own shale reserves, but also to the environmental sensitivity involved.
[12] Assume also applies to solar energy facilities

Relevant policy	Relevance to the Great Karoo EGI
	Policy provisions are made with regard to climate change adaptation and mitigation. Concerning renewable energy, the following is of relevance: » R.4.16: *Encourage and support renewable energy generation at scale*. **Landscape and scenic assets** A specialist study was undertaken into the Province's cultural and scenic landscapes. This study[13] was one of the informants of the 2014 PSDF. It established that the WCP's cultural and scenic landscapes are significant assets underpinning the tourism economy, but that these resources are being incrementally eroded and fragmented. According to the study agriculture is being reduced to 'islands', visual cluttering of the landscape by non-agricultural development is prevalent, and rural authenticity, character and scenic value are being eroded. The mountain ranges belonging to the Cape Fold Belt together with the coastline are identified as the most significant in scenic terms and underpin the WCP's tourism economy. A number of scenic landscapes of high significance are under threat, mainly from low density urban sprawl, and require strategies to ensure their long-term protection. These include landscapes under pressure for large scale infrastructural developments such as wind farms, ***solar energy*** facilities, transmission lines and shale gas development in the Central Karoo (p. 54). With regard to renewable energy, the following policy provisions are of relevance: » R.5.6: *Priority focus areas proposed for conservation or protection include -* * *Rural landscapes of scenic and cultural significance situated on major urban edges and under increasing development pressure, e.g. Cape Winelands.* * *Undeveloped coastal landscapes under major development pressure.* * *Landscapes under pressure for large scale infrastructural developments such as wind farms,* **solar energy** *facilities, transmission lines and fracking, e.g. Central Karoo.* * *Vulnerable historic mountain passes and 'poorts'.* Chapter 3.2 deals with opportunities in the WCP spatial economy, including with regard to regional infrastructure development. Essentially the same objectives are identified as in the WCIF, including the promotion of a renewable energy sector (p.61). General project-based (EIA and specialist assessment) provisions are made for evaluating the suitability of sites proposed for bulk infrastructure (Policy E.1).

3.6 Local Policy and Planning Context

The local tiers of government relevant to the Great Karoo EGI are the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province and the Beaufort West Local Municipality and the Central Karoo District in the Western Cape Province. Instruments and/or policies at both the district and local level contain objectives which align with the development of Great Karoo EGI. These include, economic growth, job creation, community upliftment and poverty alleviation.

[13] DEA&DP Winter and Oberholzer (2013). *Heritage and Scenic Resources: Inventory and Policy Framework for the Western Cape. - A Study prepared for the Western Cape Provincial Spatial Development Framework*. Draft 5.

Table 3.4: Relevant local legislation and policies for the Great Karoo EGI

Relevant policy	Relevance to the Great Karoo EGI
Pixley Ka Seme District Municipality Integrated Development Plan (IDP) (2019-2020)	The vision for the PKSDM is "Developed and Sustainable District for Future Generations" The mission statement that underpins the vision is: » Supporting our local municipalities to create a home for all in our towns, settlements, and rural areas to render dedicated services. » Providing political and administrative leadership and direction in the development planning process. » Promoting economic growth that is shared across and within communities. » Promoting and enhancing integrated development planning in the operations of our municipalities. » Aligning development initiatives in the district to the National Development Plan. The Strategic Objectives to address the vision that are relevant to the project include the promotion of economic growth in the district and enhancement of service delivery. Chapter 4 of the IDP, Development of Strategies, highlights the key strategies of the PKSDM. The IDP also notes that the growth and development context in the district has also changed radically since 2013 (after it had been stagnant for decades) owing mainly to private and public investments in the area as a hub for renewable energy generation and astronomy. The IDP notes that the economy in the Pixley Ka Seme municipal area is characterised by: » High levels of poverty and low levels of education. » Low levels of development despite the strategic location in terms of the national transport corridors. » High rate of unemployment, poverty, and social grant dependence. » Prone to significant environmental changes owing to long-term structural changes (such as climate change, energy crises and other shifts). Of specific relevance, the IDP highlights the potential for renewable energy to help address some of these challenges. The development of the Great Karoo EGI will promote economic development in the Pixley Ka Seme municipal area (albeit to a limited extent), thereby assisting in addressing some the challenges faced by the district municipality as detailed in the IDP.
Pixley Ka Seme District Municipality Spatial Development Framework (SDF) (2017)	The SDF notes that the vision for the PKSDM is "Pixley Ka Seme District Municipality, pioneers of development, a home and future for all". The Mission Statement that underpins the vision refers to: » Effective and efficient service delivery. » Optimal human and natural resource development. » Local economic growth and development, job creation and poverty alleviation. » A vibrant tourism industry. » To participate in the fight to reduce the infection rate and lessen the impact of HIV/AIDS and other communicable diseases. » A safe, secure and community friendly environment. The SDF identifies the opportunities and constraints associated with the district. An opportunity of relevance to the Great Karoo EGI (and the five renewable energy

Relevant policy	Relevance to the Great Karoo EGI
	facilities it will cater for) is renewable energy and the development of a renewable energy hub in the region.
Ubuntu Local Municipality Integrated Development Plan (IDP) (2019 – 2020)	The vision of ULM is "By 2030, Ubuntu Municipality shall be the best rural municipality through relentless pursuit of excellence through focused governance, efficient administration, and effective service delivery for inclusive targeted social and economic development against all odds". The mission is to: » Maximize the utility of the municipal resources in a sustainable, developmental, and economic manner to better the life of all. » Improve institutional effectiveness and efficiency. » Optimally develop our human, financial and natural resources. » Create an enabling environment for local economic growth in order to create employment opportunities and alleviate poverty. » Work with all our existing and prospective partners to establish a vibrant tourism industry. » Participate in the fight to reduce the HIV/AIDS infection rate and lessen the impact thereof. » Focus on youth development, women empowerment and enabling the disabled to play a meaningful role in unlocking human potential. » Ensure a safe, secure and community friendly environment. » Maintain sound and sustainable management of financial and fiscal affairs. The IDP identifies a number of challenges facing the area in terms of economic development and growth. Of relevance to the project these include: » Unemployment and poverty. » Shortage of critical skills » Needs of vulnerable groups, including women, disabled and youth. » Access to basic services such as water, sanitation, electricity and housing. » Improved access to services in education, health and social services. » Reduction in the rate of crime. These issues can be addressed by supplier and enterprise development and enterprise development spend linked to the Great Karoo EGI.
Central Karoo District Municipality IDP 2022/2027	The mission of the Central Karoo District is "Central Karoo, a place where we envisage and ensure economic growth and social development and sustainability, whilst maining its rural character, embraxcing and developing the diversity of it's people". The stratetgic objectives of the municipality area to: » Facilitate good governance principles and effective stakeholder participation. » Build a well capacitated workforce, skilled youth and communities. » Promote socially stable communities, ensure safe roads, minimise the impact of disasters and improve public safety. » Promote economic growth and transformation. » Deliver a sound and effective administration with financial viability and sustainability. The development of the Great Karoo EGI will promote skills development and economic growth in the area and is therefore in line with the objectives of the Central Karoo District.

Relevant policy	Relevance to the Great Karoo EGI
Beaufort West Local Municipality IDP 2022/2027	The vision of the Beaufort West Local Municipality is "Beaufort West in Central Karoo, the economic gateway to the Western Cape, where people are developed and living together in harmony". The strategic objectives of the municipality are to: » Provide, maintain and expand basic services to all people in the municipal area. » Maintain a sustainable, safe and healthy environment. » Promote broad-based growth and development. » Maintain and ethical, accountable and transparent administration. » Enable a diverse and capacitated workforce. » Uphold sound financial management principles and practices. Some of the key issues and challenges experienced by the municipality include low economic growth, high unemployment, low skills level, high levels of poverty and lack of economic opportunities. The IDP lists the availability of land for alternative energy construction sites as one of the opportunities in the municipality. The development of the Great Karoo EGI will promote economic development in the Beaufort West municipal area (albeit to a limited extent), thereby assisting in addressing some the challenges faced by the municipality as detailed in the IDP and assisting the municipality to achieve its objective of maintaining a sustainable, safe and health environment as the renewable energy facilities which the Great Karoo EGI will cater for do not result in the emission of green house gases into the atmosphere.

CHAPTER 4: NEED AND DESIRABILITY

One of the objectives of the EIA process is to motivate for "*the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint*". The need and desirability of a development needs to consider whether it is the right time and right place for locating the type of land-use/activity being proposed. Need and desirability is therefore equated to the wise use of land and should be able to answer the question of what the most sustainable use of land is.

This chapter provides a description of the need and desirability of the Great Karoo EGI at the project site considered reasonable and feasible from a technical perspective by the project Applicant. Although the Great Karoo EGI project is being assessed as part of a stand-alone BA process, the proposed infrastructure is directly linked to five renewable energy facilities (two wind farms and three solar energy facilities) proposed as part of a renewable energy cluster and is essential infrastructure for the operation of these facilities to enable the electricity evacuation to the national grid. In the absence of the proposed Great Karoo EGI, the five renewable energy facilities will not be able to operate. Therefore, considering the dependency of the proposed renewable energy facilities on the Great Karoo EGI, the need and desirability of this grid connection infrastructure is directly linked to the need and desirability of the proposed renewable energy facilities that it will cater for.

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 the EIA Regulations, 2014 - Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
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 Great Karoo EGI is included and discussed as a whole within this chapter. The need and desirability for the development has been considered from an international, national, regional, and site-specific perspective.

4.2 Need from an International Perspective

The need and desirability of the Great Karoo EGI (and the five renewable energy facilities it will cater for), from an international perspective, can be described through the project's alignment with internationally recognised and adopted agreements, protocols, and conventions. South Africa is signatory to a number of international treaties and initiatives, including the United Nation's Development Programme's (UNDP's) Sustainable Development Goals (SDGs). The SDGs address social and economic development issues such as poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanization, environment, and social justice. The SDGs comprise 17 global goals set by the United Nations. The 17 SDGs are characterised by 169 targets, and 304 indicators.

Goal 7 of the SGDs relates to "Affordable and Clean Energy", with the aim of the goal being to ensure access to affordable, reliable, sustainable, and modern energy for all. The following targets and indicators have been set for Goal 7:

Targets		Indicators	
7.1	By 2030, ensure universal access to affordable, reliable and modern energy services.	7.1.1 7.1.2	Proportion of population with access to electricity. Proportion of population with primary reliance on clean fuels and technology.
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix.	7.2.1	Renewable energy share in the total final energy consumption.
7.3	By 2030, double the global rate of improvement in energy efficiency.	7.3.1	Energy intensity measured in terms of primary energy and GDP.
7.A	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.	7.A.1	Mobilised amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment.
7.B	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.	7.B.1	Investments in energy efficiency as a percentage of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services.

The development of the Great Karoo EGI would connect five renewable energy facilities, with a combined capacity of 580MW, to the national grid, which would contribute positively towards achieving Goal 7 (and specifically 7.2.1) of the SGDs through the following means:

- By generating affordable and clean energy.
  - A study published by the CSIR on 14 October 2016 ("Cost of new power generators in South Africa Comparative analysis based on recent IPP announcements", Dr Tobias Bischof-Niemz and Ruan Fourie), which took into consideration the results of the cost prices bid successfully under the DoE's REIPPP and Coal Baseload IPP Procurement (CBIPPP) Programmes, found that wind and solar PV were 40% cheaper than new baseload coal (i.e. R0.62/kWh for wind and PV vs R1.03 for coal).
  - Wind and solar power technologies are one of the cleanest electricity generation technologies as they are not consumptive technologies and do not result in the release of emissions during their operation.
- By contributing towards South Africa's total generation capacity, specifically through the utilisation of renewable energy resources.

The Kyoto Protocol (1997) is also relevant to the need of the development of the Great Karoo EGI from an international perspective. 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 Great Karoo EGI will enable 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, through the generation of energy without the emission of greenhouse gasses.

4.3 Need from a National Perspective

The National Development Plan (NDP) envisages that by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates; that is socially equitable through expanded access to energy at affordable tariffs; and that is environmentally sustainable through reduced emissions and pollution. Historically, coal has provided the primary fuel resource for baseload electricity generation in South Africa. In 2020, 86% of South Africa's electricity came from coal, compared to the global average of 34%[14]. Taking into consideration the need to ensure adequate supply of electricity and meet international obligations in terms of addressing climate change, Government has identified the need to diversify the energy mix within the country.

The Great Karoo EGI (and the five renewable energy facilities it will cater for) is proposed in specific response to the identified energy mix of the Country as per the requirements set out in the IRP with regards to renewable energy targets. As a result, the need and desirability of the project from a national perspective can largely be assimilated from the project's alignment with national government policies, plans, and programmes which have relevance to energy planning and production (as discussed in detail in Chapter 3). The following key policies have been developed by Government to take into account South Africa's current energy production and projected future demands, and provides the necessary framework within which energy generation projects can be developed:

» Integrated Energy Plan (IEP); and
» Integrated Resource Plan (IRP).

The above-mentioned policies have been extensively researched and are updated on an on-going basis to take into consideration changing scenarios, new information, developments in new technologies, and to reflect updated demands and requirements for energy production within the South African context. These plans form the basis of South Africa's energy generation sector and dictate national priorities for energy production.

The IEP is intended to provide a roadmap of South Africa's future energy landscape which guides future energy infrastructure investments and policy development. South Africa has a good wind and solar resource for the development and generation of wind and solar energy. In terms of electricity generation, the IEP states that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources.

The IRP for Electricity 2010 – 2030 (gazetted in 2019) is a subset of the IEP and constitutes South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. This plan provides for the development of 17 743MW of capacity from large scale wind energy facilities by 2030 and the development of 6 000MW from large scale solar energy facilities being allocated by 2030.

In addition to the policy considerations detailed above, Government has prioritised post COVID-19 turnaround plans in terms of renewable energies within the Just Energy Transition (JET), coupled with key

[14] https://mg.co.za/business/2021-03-31-south-africa-tops-g20-coal-reliance-list-in-2020-report-finds/

development objectives of the various spheres of government. These policies share the same ideals, such as:

» The utilisation, application, and investment in renewable energy resources in South Africa is considered to be an essential means of reducing the carbon footprint of the country,
» Diversifying the national economy,
» Reducing poverty, and
» Providing critical additional energy to that of Eskom

Government has compiled an Economic Reconstruction and Recovery Plan which was presented to Parliament in October 2020. According to this plan, the economic survey will rely on a massive investment in infrastructure, including energy, telecommunications, ports and rail. The core elements of the Economic Reconstruction and Recovery Plan are as follows:

1. Priority interventions for economic recovery: the plan sets out eight priority interventions that will ignite South Africa's recovery and reconstruction effort. These are the flagship initiatives that all of society will rally around to build a new economy (**Figure 4.1**).
2. Enabling conditions for growth: these are growth-enhancing reforms and other preconditions for an inclusive, competitive and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery requires careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution and is supported by enhanced institutional arrangements to ensure implementation and accountability.

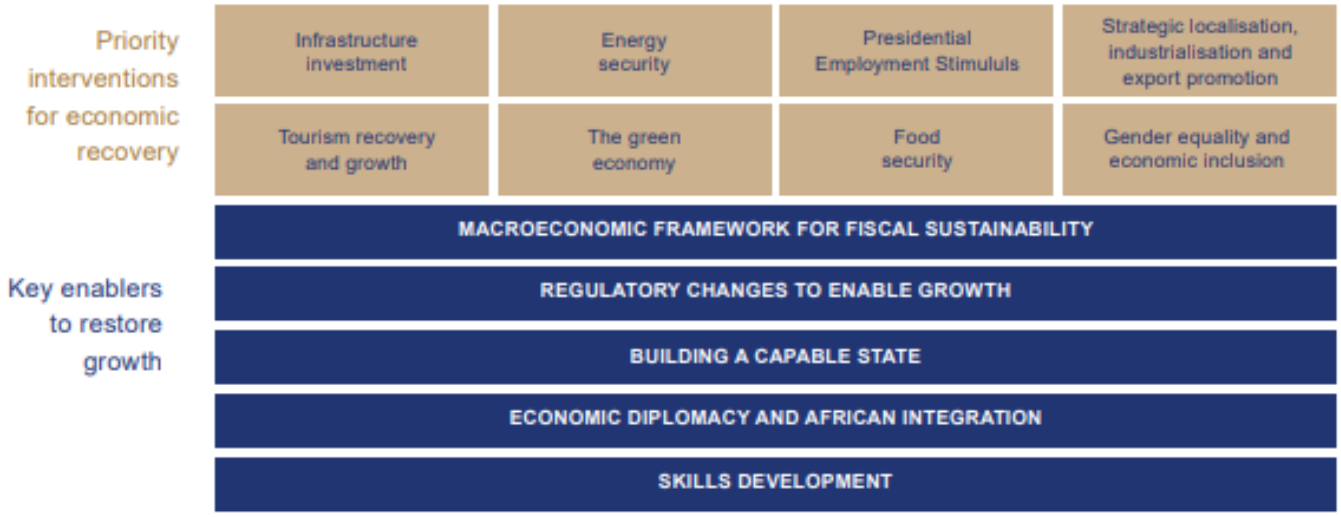


Figure 4.1: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

The plan recognises energy security as the most important prerequisite for the recovery agenda. One of the key commitments of the plan is therefore to achieve sufficient, secure and reliable energy supply within two years by improving Eskom's performance and rapidly expanding generation capacity through a diverse energy mix. The development of the Great Karoo EGI is identified as associated and required infrastructure which is considered to be a mechanism for securing additional power generation capacity. Without the

development of the Great Karoo EGI, evacuation of additional electricity from the Great Karoo renewable energy facilities will not be possible.

The five renewable energy facilities which the Great Karoo EGI will cater for will ensure the optimisation of a supply of steady state baseload type power, as well as play a significant role in the Just Energy Transition ("JET") by supplying low-cost energy to the national grid. At the same time, it will contribute to a JET fund to assist in transitioning jobs from the fossil fuel sector in Mpumalanga to renewable energy. The high-quality wind and solar resource and scale of the portfolio may also play a possible role in contributing to the hydrogen economy in South Africa, with Europe as a possible export market.

It is the developer's intention to bid the renewable energy facilities that the Great Karoo EGI will cater for under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or a similar programme, with the aim of evacuating the generated power into the national grid.

The South African government has identified the green economy as one of 12 job drivers that could help contribute to creating 5 million additional jobs by 2020. The New Growth Path, in which the sectoral jobs targets are disaggregated, envisages that as many as 300 000 new direct jobs could be created in the areas of natural resource management and renewable energy construction (Department of Energy, 2019).

The need for new power generation from wind and solar energy (and the evacuation and use thereof) has therefore been identified and assessed by Government at a national scale considering the national energy requirements as well as international commitments to address climate change under the Paris Agreement, and provision has been made for the inclusion of new renewable power generation capacity in South Africa's energy mix. The implementation of the Great Karoo EGI will enable positive contribution towards the identified national need, while simultaneously contributing to job creation and socio-economic development, which is identified as a need for the country within the National Development Plan. The renewable energy facilities will make use of renewable energy technology and would contribute positively towards reducing South Africa's GHG emissions and the Just Energy Transition of the country. In addition, by making use of renewable power technology, the project would have reduced water requirements, when compared with some other generation technologies such as coal and gas, in alignment with one of the vision 2030 themes of DWS's National Water Resource Strategy 2 (2013) (i.e., transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

4.4 Need from a Provincial Perspective

South Africa's electricity generation mix has historically been dominated by coal. This can be attributed to the fact that South Africa has abundant coal deposits, which are relatively shallow with thick seams, and are therefore easy and comparatively cost effective to mine. In 2016, South Africa had a total generation capacity of 237 006GWh; approximately 85.7% (equivalent to 203 054GWh) of this figure was generated by coal, 0.9% (equivalent to 2 151GWh) was generated by wind and a further 0.9% (equivalent to 2 151GWh) was generated by solar (refer to **Figure 4.2**).

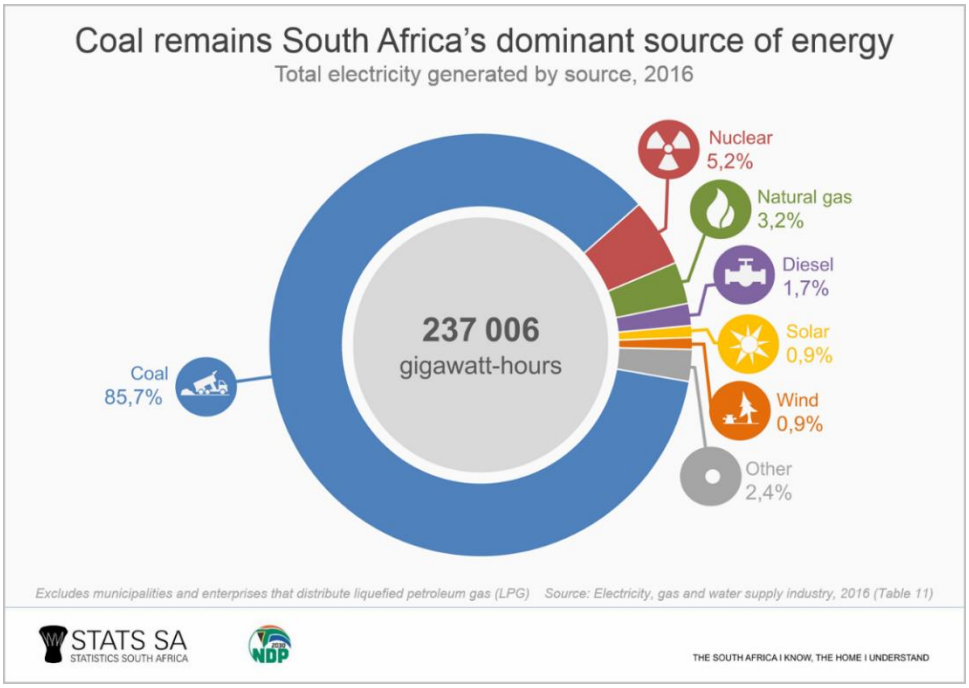


Figure 4.2: Overview of South Africa's electricity generation by source (source: StatsSA 2016 Electricity, gas and water supply industry)

Whereas the majority of South Africa's electricity generation infrastructure is currently located within the Mpumalanga Province due to the location of coal resources within this province, the Northern Cape Province has been identified as an area where the development of wind farms and solar energy facilities is a feasible and suitable option for electricity generation.

The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the province is to enable sustainability through sustainable development. The province considers social and economic development as imperative in order to address the most significant challenge facing the Northern Cape, which is poverty.

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.

It can be confirmed that from a regional perspective there is a need and desirability for the development of renewable energy facilities within the Northern Cape Province. The need for the Great Karoo EGI is therefore confirmed based on the need for the evacuation of the generated renewable electricity, which will be enabled by the proposed infrastructure.

The Western Cape Province has been identified as an area where the development of renewable energy facilities is a feasible and suitable option for electricity generation. The Western Cape Strategic Provincial Plan (2019-2024) identifies five strategic goals for the 2019-2024 period which include building safe communities; boosting the economy and job creation; empowering people; promoting mobility and spatial transformation and driving innovation.

In terms of the strategic goals Focus Area 5: Creating an enabling environment for economic growth through resource resilience, the Western Cape Government has indicated that it will respond to and mitigate the challenges and impacts of climate change and improve the resource resilience of the economy through Energy Security. According to the Plan, the Western Cape Government will continue to drive initiatives that support the Green Economy, such as smart grids, large-scale rooftop PV systems, and green infrastructure. Support will be provided to procure power from IPPs, once this is legally possible, with national engagements remaining a priority. The growth of the renewable energy sector has the potential for high labour absorption and can also link to increased opportunities for SMMEs, especially for SSEG.

The development of renewable energy facilities that the Great Karoo EGI will cater for will assist the Western Cape provincial government with achieving some of the five strategic goals (even if only to a limited extent) and is therefore considered as a desired development within the province.

4.5 Need from a District and Local Perspective

From a district level, the need for the development of the Great Karoo EGI (and the five renewable energy facilities that it will cater for) is reflected within the Pixley Ka Seme District Municipality and then Ubuntu Local Municipality, as well as the Central Karoo District and Beaufort West Local Municipality planning documentation. The following planning policies make reference to the need for the development of renewable energy facilities (and by consequence their associated grid connection infrastructure) within the municipal area:

- The Pixley Ka Seme District Municipality Integrated Development Plan (IDP) for 2019-2020 notes that the economy in the Pixley Ka Seme municipal area is characterised by high levels of poverty and low levels of education; low levels of development despite the strategic location in terms of the national transport corridors; high rate of unemployment, poverty, and social grant dependence; and prone to significant environmental changes owing to long-term structural changes (such as climate change, energy crises and other shifts). The IDP highlights the potential for renewable energy to help address some of these challenges.
- The Ubuntu Local Municipality IDP for 2019-2020 states that although electricity appears to be in good supply and widely available throughout the municipal area, there are still some issues in this regard, such as the need to electrify new developed sites in the municipal area.
- The Central Karoo District Municipality IDP (2022 – 2027) identifies the move to less carbon-intensive electricity production through procuring at least 20 000MW of renewable energy as one of the objectives of the district. The IDP further states that introduction of renewable energy generation in the greater Karoo region will add value to the GDP within certain economic sectors and, by implication, change the composition and character of the towns.
- The Beaufort West Local Municipality IDP (2017 – 2022) highlights the risks posed by climate change, noting that the risk is relatively high in Beaufort west Municipality as it is an arid area that has always been prone to drought situations. contribute towards growth and development of the municipality, including the introduction of solar energy. The IDP also identifies major infrastructure projects that can be implemented to develop and promote economic development in the area, including large wind and solar energy projects subject to appropriate guidelines and siting principles.

Considering the requirements and need and desirability for the development of renewable energy facilities and the associated required infrastructure (i.e., the Great Karoo EGI) within the municipal area, it is considered that there is a definite need for developments of such a nature considering the development

plans of the relevant local and district municipalities and the reliance of the affected areas on such developments.

4.6 Receptiveness and Desirability of the project site to develop the Great Karoo EGI

The feasibility of the project site and power line corridor for the development of the Great Karoo EGI also provides an indication of the desirability of the development within the site-specific location. The section below provides a description of the site-specific considerations that contribute to the desirability of the project within the identified project site.

The Great Karoo EGI is proposed to be constructed approximately 35km south-west of Richmond and 80km south-east of Victoria West on privately-owned properties currently used mainly for livestock farming. The affected farm portions have not been considered for an alternative land use such as urban development or mining, and therefore the proposed infrastructure does not conflict with the current land use of the project site (i.e., the affected properties). The site falls within the Central Corridor of the Strategic Transmission Corridors, an area that is considered to be of strategic importance for large-scale electricity transmission and distribution infrastructure in terms of Strategic Integrated Project (SIP) 10: Electricity Transmission and Distribution.

The project site proposed for the development of the Great Karoo EGI displays characteristics which contribute to the overall desirability. These include:

Extent of the project site: The affected properties desirable for and available for the development cover an area of ~41 500ha. This area is sufficient to accommodate the proposed Great Karoo EGI and is considered to be sufficient space for the substation development footprint and power line route to be designed and to consider the identified environmental sensitivities. A development footprint of 19.95ha is required for the central collector substation and two 37.5km long and 1km wide grid corridor alternatives are being considered for the assessment and placement of the overhead power line, which will provide for the avoidance of sensitive environmental areas and features and allow for the micro-siting of the power line within the corridor.

Site access: Access to the Great Karoo EGI site is ample with the presence of existing roads mainly consisting of national and regional roads. The project site is bisected by the N1 national road, which provides access to the project site. The R63 is located to the south-west of the project site. The gravel main access road which is bisected by the project site provides direct access to the EGI and will therefore be utilised for accessing the project site. During construction, a permanent access road along the length of the power line corridor between 4 - 6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation.

Land availability: The affected properties are privately-owned land parcels currently used mainly for livestock farming. A landowner's consent has been obtained for the property within which the central collector substation is proposed (i.e., Portion 0 of Farm Rondavel 85). Although landowner's consents are not required for linear developments, the applicant has engaged with the affected landowners to confirm the availability of the properties for the development of a 132kV double circuit overhead power line and substation.

Topographical considerations and existing infrastructure: The study area occurs on land that ranges in elevation from approximately 1170m above sea level (in the south-western corner of the study area) to 1 830m (at the top of the mountains to the east). The terrain along the proposed grid corridor alternatives is predominantly flat with some hills and ridges occurring predominantly to the south of the grid corridors. Therefore, from a topographical perspective, there are very few physical constraints present which would have an effect on the construction of the proposed infrastructure.

The location of the project site in proximity to the Gamma Substation was also considered. Critical in the selection process was that there is available capacity at the Gamma Substation to accommodate the electricity generated from the 5 renewable energy facilities.

Current land use and character: The project site has a rural character and consists of a landscape that can be described as remote due to its considerable distance from any major metropolitan centres or populated places. The predominant land use in the area is stock farming (predominantly sheep, game or goat farming). Since rainfall is low and water is scarce, crop farming accounts for only a small portion of the land use and is largely confined to the more fertile floodplain valleys. There are no designated protected areas within the region and no major tourist attractions, or destinations were identified within the study area. There are however two overnight facilities, namely the Bloemhof Karoo Farmstay and the Rondawel Guest Farm. The former facility appears to be located on the farm identified for the Angora Wind Farm, which is one of the renewable energy facilities that the proposed EGI will cater for. In spite of the rural and natural character of the study area, there are a large number of overhead power lines in the study area, all congregating at either the Gamma or Victoria Cap Substations.

The development of renewable energy projects (and the associated required grid connection infrastructure (i.e., the proposed Great Karoo EGI)) within this region provides an opportunity to relieve the area, to some extent, which has suffered severe socio-economic challenges in terms of unemployment and poverty. The development of the Great Karoo EGI (and the five renewable energy facilities that it will cater for) on the affected properties will introduce a new land-use to these properties, create employment opportunities, promote skills development, create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province.

Proximity to Towns with a Need for Socio-Economic Upliftment: The proposed project is located near the towns of Richmond and Vitoria West, within the Pixley Ka Seme District Municipality and the Ubuntu Local Municipality (Ward 3) in the Northern Cape Province. A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality (Ward 1) of the Central Karoo District in the Western Cape Province. The official unemployment rate in the Ubuntu Local municipality in 2011 was 18.1%, while 44.2% were employed, and 33.2% were regarded as not economically active. The figures for Ward 3 (i.e., the affected ward) in 2011 were 6.8% unemployed, 62.5% employed and 28.4% not economically active. The official unemployment rate in the Beaufort West Local Municipality in 2016 was 12.2%, while 44.1% were regarded as not economically active and 8.3% were discouraged work seekers. The 2020 Socio-economic profile of the Beaufort West Local Municipality prepared by the Provincial Government notes that the Beaufort West Local Municipality (24.2%) had the highest unemployment area in the Central Karoo District Municipality (22%) in 2019. The rate was also higher than the provincial rate (19.4%). With the development of the Great Karoo EGI, secondary social benefits can be expected in terms of additional spend in the nearby towns due to the increased demand for goods and services.

Considering the above, it is clear that a need for employment opportunities and skills development is present within the area.

4.7 Need for and Benefits of Renewable Energy in the South African Environment

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

***Socio-economic upliftment of local communities*:** The Great Karoo EGI and the rentable energy facilities it will cater for have the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. Some of the challenges facing the Local and District municipalities, as detailed in the IDPs include high rates of unemployment, high levels of poverty, and low levels of development despite the strategic local in terms of the national transport corridors. The Local and District municipalities are therefore in need of economic development, sustainable employment opportunities and growth in personal income levels.

Since inception of the REIPPPP in 2011, approximately 59 071 job years for South African citizens to date have been created.

Great Karoo EGI and the rentable energy facilities it will cater for have the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPPP, the project will commit benefits to the local community in the form of job creation, localisation, and community ownership. In accordance with the DMRE's bidding requirements of the REIPPPP, a percentage of the revenue generated per annum during operation will be made available to local communities through a social beneficiation scheme. Therefore, the potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment.

Increased energy security: Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. According to CSIR's power sector statistics (2021), South Africa experienced loadshedding for 650 hours in the first half of 2021 (15% of the time) wherein 963GWh of estimated energy was shed (mostly stage 2 load shedding). This is 76% of the total loadshedding experienced during 2020[15]. It is important to note that although extensive load shedding continued during the first half of 2021, record relative variable renewable energy contributions were recorded.

Resource saving: It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability. Renewable energy also translates into

[15] https://www.csir.co.za/csir-releases-power-sector-statistics-first-half-2021

revenue savings, as fuel for renewable energy facilities is free, while compared to the continual purchase of fuel for conventional power stations.

According to the IPP Procurement Programme overview report dated 31 March 2021, water savings of 71.7 million kilolitres has been realised by the programme from inception to the date of this publication, of which 4.2 million kilolitres is in the 2021 reporting quarter included in this report.

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

According to the IPP Procurement Programme overview report, as of 31 March 2021, the REIPPPP had made the following significant impacts in terms of energy supply:

- 6 422MW of electricity had been procured from 112 Renewable Energy Independent Power Producers (IPPs) in seven bid rounds[16].
- 5 078 MW of electricity generation capacity from 79 IPP projects has been connected to the national grid.
- 59 761GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational in November 2013. Renewable energy IPPs have proved to be very reliable. Of the 79 projects that have started operations, 67 projects have been operational for longer than a year. The electrical energy generated over the past 12-month period for the 67 projects is 11 679GWh, which is 94% of their annual energy contribution projections of 12 481GWh over a 12-month delivery period. Twenty-six (26) of the 67 projects (39%) have individually exceeded their projections.

In August 2021, Bid Window 5, which had aimed to sign up 2 600MW of power, including 1 600MW of wind and 1 000MW of solar was open. It attracted 102 bids, offering capacity of 9 644MW. 25 Preferred Bidders were selected to provide a total of 2 583MW from wind and solar developments.

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

The following has been achieved by the IPP programme (March 2021) in terms of investment and economics:

- Investment (equity and debt) to the value of R209.7 billion was attracted in seven bid rounds.
- Socio-economic development contributions of R1.5 billion to date, of which R103.5 million was spent in this 2021 reporting quarter.
- Enterprise development contributions of R463.5 million to date, of which R34.8 million was spent in this 2021 reporting quarter.

Pollution reduction: The release of by-products through the burning of fossil fuels for electricity generation has a particularly hazardous impact on human health and contributes to ecosystem degradation. The use

[16] Bid windows1, 2 ,3 ,3.5 ,4 and small BW1(1S2) and small BW2(2S2). 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021.

of solar irradiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.
The overview of the Independent Power Producers Procurement Report (March 2021) indicates that a carbon emission reduction of 60.7 Mton CO_2 has been realised by the IPP programme from inception to date, of which 3.6 Mton is in the 2021 reporting quarter.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of GHG emissions. According to the Climate Transparency Report (2020), total GHG emissions in South Africa (excluding land use) have increased by 41% since 1990, but emissions in recent years have been almost constant, owing largely to low economic growth and a sharp rise in electricity prices. South Africa is ranked 12th worldwide in terms of per capita carbon dioxide emissions as of 2021[17]. Since its inception, the REIPPPP has achieved carbon emission reductions[18] of 60.7 Mton of CO_2. The development of renewable energy facilities that the Great Karoo EGI will cater for will result in considerable savings on tons of CO_2 emissions.

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

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa. The construction phase will create 350 temporary employment opportunities and the operation phase will create 20 full-time employment opportunities.

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

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

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

[17]https://www.polity.org.za/article/south-africa-the-12th-biggest-source-of-greenhouse-gases-yes-but-thats-not-the-only-measure-that-matters-2021-04-19

[18] Carbon emission reduction is calculated based on a displacement of power, from largely coal-based to more environmentally friendly electrical energy generation, using a gross Eskom equivalent emissions factor of 1.015 tons CO_2/MWh.

CHAPTER 5: APPROACH TO UNDERTAKING THE BASIC ASSESSMENT PROCESS

In terms of the EIA Regulations of December 2014 (as amended in April 2017) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of the Great Karoo EGI is a listed activity requiring Environmental Authorisation.

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

South Africa has been subject to the enforcement of Government Gazette 43096 which places the country in a national state of disaster limiting the movement of people to curb the spread of the COVID-19 virus. The status of national state of disaster was still relevant at the commencement of the BA process. Considering the limitations in place, 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, while remaining within the limits as stipulated by the National Government. This chapter serves to outline the process that was followed during the BA process.

5.1 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 (as amended) - Appendix 1: Content of Basic Assessment Reports:

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 Great Karoo EGI have been included in **section 5.2**, **Table 5.1**. The specific project activity relating to the relevant triggered listed activity has also been included in **Table 5.1**.
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.	A public participation plan was prepared and approved by the DFFE (**Appendix C1**). The details of the public participation process undertaken have been included and described in **section 5.3.2**.
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 received from the commencement of the BA process have been included and responded to in the Comments and Responses (C&R) Report (**Appendix C9**). 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 and responded to as part of a C&R Report (**Appendix C9**) to be submitted as part of the Final BA Report to the DFFE for decision-making.

Requirement	Relevant Section
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 Great Karoo EGI has been included in **section 5.5**.
(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 Great Karoo EGI is included in **section 5.6**.

5.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to the Great Karoo EGI, as identified at this stage in the process, are described in more detail under the respective sub-headings.

5.2.1 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(5) 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. Due to the fact that the Great Karoo EGI is associated with five power generation projects, and therefore relates to the IRP 2010 – 2030, the National Department of Forestry, Fisheries and the Environment (DFFE) has been determined as the Competent Authority in terms of GNR 779 of 01 July 2016. The Provincial Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD & LR) is the Commenting Authority on the project.

The need to comply with the requirements of the EIA Regulations published under the NEMA ensures that proponents 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 and application for Environmental Authorisation.

The BA process being conducted for the Great Karoo EGI is undertaken in accordance with Section 24(5) of the NEMA, which defines the procedure to be followed in applying for Environmental Authorisation, 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 the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an Environmental Authorisation from the competent authority subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

Table 5.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) that apply to the Great Karoo EGI, and for which an application for Environmental Authorisation has been submitted to the DFFE. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 5.1: Listed activities as per the EIA regulations that are triggered by the Great Karoo EGI

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
Listing Notice 1 (GNR 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 22 but less than 275 kilovolts. ***The Great Karoo EGI will comprise the construction and operation of a 132kV central collector substation and 132kV double circuit overhead power line.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	12(ii)(a)(c)	The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more; where such development occurs – (a) within a watercourse or (c) within 32 meters of a watercourse, measured from the edge of a watercourse. ***The development of the Great Karoo EGI will require the establishment of infrastructure with a physical footprint exceeding 100m^2. The central collector substation will occupy a footprint of 19.95ha. A water course (i.e., drainage features) infringes into the substation development footprint. The overhead power line traverses watercourses (i.e., an episodic rivers and drainage features), with pylon placement occurring within 32m of these watercourses.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	14	The development and related operation of facilities and 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 metres or more but not exceeding 500 cubic metres. ***The development of the Great Karoo EGI 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) associated with the central collector substation, where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles, or rock of more than 10 cubic meters from a watercourse. ***Drainage features are present within the grid corridor and development footprint for the central collector substation. During the construction phase, more than 10 cubic metres of rock will be removed from the water features for the development of the Great Karoo EGI.***

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation. ***The project will require the clearance of an area of ~19.95ha) (equivalent to the development footprint) of vegetation to accommodate the central collector substation, as well as vegetation associated with the power line servitude. The project is proposed on a property where the predominant land use is livestock farming and comprises of indigenous vegetation. The project would therefore result in the clearance of an area of indigenous vegetation of 1ha or more, but less than 20ha.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	28(ii)	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 Great Karoo EGI (considered to be an industrial development) will be constructed and operated on land currently used primarily for livestock farming. The development footprint considered for the establishment of the central collector substation is up to 19.95ha and is located outside an urban area.***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	4(g)(ii)(ee)	The development of a road wider than 4 metres with a reserve less than 13.5 metres. g. Northern Cape ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***During construction, a permanent access road along the length of the power line corridor between 4 - 6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation. The Great Karoo EGI falls within the Northern Cape Province and outside an urban area. The grid corridor overlaps with a CBA.***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	10(g)(ii)(iii)(ee)	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 g. Northern Cape ii. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland. iii. Outside urban areas:

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
		(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The development of the Great Karoo EGI will require the construction and operation of facilities for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the central collector substation, where such storage will be undertaken inside containers with a capacity not exceeding 80 cubic metres. A water course (i.e., drainage features) infringes into the substation development footprint and grid corridor. The Great Karoo EGI falls within the Northern Cape Province and outside urban areas. The corridor overlaps with a CBA.***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	12(g)(ii)	The clearance of an area of 300 square metres or more of indigenous vegetation g. Northern cape ii. Within critical biodiversity areas identified in bioregional plans. ***The development of the Great Karoo will require the clearance of an area of ~19.95ha of indigenous vegetation to accommodate the central collector substation, as well as vegetation associated with the power line servitude within a CBA1 in the Northern Cape Province.***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	14(ii)(a)(c)(g)(ii)(ff)	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; or (c) within 32 metres of a watercourse, measured from the edge of a watercourse. g. Northern Cape ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The development of the Great Karoo EGI will require the establishment of infrastructure with a physical footprint exceeding 10m^2. The central collector substation will occupy a footprint of 19.95ha. A water course (i.e., drainage features) infringes into the substation development footprint. The overhead power line traverses watercourses (i.e., an episodic rivers and drainage features), with pylon placement occurring within 32m of these watercourses. The EGI falls within the Northern Cape***

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
		Province and outside an urban area. The corridor overlaps with a CBA.
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	4(i)(ii)(aa)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. i. Western Cape ii. Areas outside urban areas (aa) Areas containing indigenous vegetation. ***During construction, a permanent access road along the length of the power line corridor between 4 - 6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation. A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province. The Great Karoo EGI falls outside an urban area within an area containing indigenous vegetation***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	10(i)(ii)	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. i. Western Cape ii. All areas outside urban areas. ***The development of the Great Karoo EGI will require the construction and operation of facilities for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the central collector substation, where such storage will be undertaken inside containers with a capacity not exceeding 80 cubic metres A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province. The Great Karoo EGI falls outside urban areas.***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	12(i) (ii)	The clearance of an area of 300 square metres or more of indigenous vegetation. i. Western Cape ii. Within critical biodiversity areas identified in bioregional plans. ***The development of the Great Karoo will require the clearance of an area of ~19.95ha of indigenous vegetation to accommodate the central collector substation, as well as vegetation associated with the power line servitude within a CBA1. A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province.***
Listing Notice 3	14(ii)(a)(c)(i)(i)(ff)	The development of—

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
(GNR 325) 08 December 2014 (as amended on 07 April 2017)		(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; or (c) within 32 metres of a watercourse, measured from the edge of a watercourse. i. Western Cape i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The development of the Great Karoo EGI will require the establishment of infrastructure with a physical footprint exceeding 10m2. The central collector substation will occupy a footprint of 19.95ha. A water course (i.e., drainage features) infringes into the substation development footprint. The overhead power line traverses watercourses (i.e., an episodic rivers and drainage features), with pylon placement occurring within 32m of these watercourses. The EGI falls outside an urban area. The corridor overlaps with a CBA. A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province.***

5.2.2 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 of Water and Sanitation or the relevant Catchment Management Agency (CMA). Water use is defined broadly, and includes 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.

Table 5.1 lists the possible Water Uses associated with the proposed project and identified in terms of the NWA which require licensing either in the form of a General Authorisation (GA), or in the form of a Water Use License (WUL). The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 5.1: List of Water Uses published under Section 21 of NWA, as amended.

Activity No.	Description of Water Use
Section 21 (c)	Impeding or diverting the flow of water in a watercourse. ***The grid corridor and the footprint considered for the establishment of the central collector substation are associated with the presence of watercourses, namely, episodic rivers and drainage features. Activities pertaining to the establishment of the infrastructure might***

Activity No.	Description of Water Use
	encroach on the watercourses which may lead to an impediment and diversion of the flow of water in the watercourses.
Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***The grid corridor and the footprint considered for the establishment of the central collector substation are associated with the presence of watercourses, namely, episodic rivers and drainage features. Activities pertaining to the establishment of the infrastructure might alter the bed, banks, course or characteristics of the watercourses.***

In the event that the flow of water in the watercourses is affected and the bed, banks or course characteristics are altered then a water use authorisation would be required. This will need to be in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GN R267), or a GA registered in accordance with the requirements of Revision of General Authorisation. The process of applying for a WUL or GA registration will only be completed once a positive EA has been received and the project (including the renewable energy facilities it will cater for) selected as Preferred Bidder under the REIPPPP or similar programme. This is in line with the requirements of the Department of Water and Sanitation (DWS).

5.2.3 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.

Section 38: Heritage Resources Management

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 such 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 Great Karoo EGI, 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 (GN R668).

5.3 Overview of the Basic Assessment Process for the Great Karoo EGI

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 (GN R326), as amended.
- Undertaking a public participation process in accordance with Chapter 6 of GN R326, and the Department of Environmental Affairs (2017), Public Participation guidelines in terms of 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 (GN R326), as amended, and the requirements of the Specialist Protocols published in Regulation GNR 320, issued 20 March 2020 and 30 October 2020, where relevant, as well as other relevant guidelines.
- Preparation of a BA Report and EMPr in accordance with the requirements of Appendix 1 and Appendix 4 of GN R326.
- 30-day public and authority review period of the BA report.
- Compilation of a C&R Report detailing the comments raised by I&APs, 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.

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

In terms of Government Notice 779 of 01 July 2016, the National Department of Forestry, Fisheries, and the Environment (DFFE) is the competent authority for all projects related to the IRP. The proposed Great Karoo EGI is required to evacuate power generated by five renewable energy facilities (including two wind farms and three solar energy facilities) to the national grid. As the project is located within the Northern Cape Province, and a portion (~2km) of the grid corridor falls within the Western Cape Province, the Northern Cape DAEARD & LR and the Western Cape DEA & DP are the commenting authorities. Consultation with the regulating authorities (i.e., DFFE and Northern Cape DAEARD & LR) as well as with all other relevant Organs of State will continue throughout the BA process. To date, this consultation has included the following:

- Submitting a pre-application meeting request form, together with the Public Participation Plan to the DFFE via email for approval on **02 September 2021**. Following submission of the Public Participation Plan, the DFFE provided approval of the submitted plan via email on **15 September 2021** (refer to **Appendix C1**).
- Submission of the application form for Environmental Authorisation to the DFFE via the use of the DFEE Novell Filr System.
- 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 which 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.**

5.3.2. 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 (GN R326) (as amended). The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GN R326) (as amended) and is being followed for this proposed project.

The Public Participation Process undertaken for the proposed development of the Great Karoo EGI 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 and Fisheries (DFFE) in terms of consultations with I&APs to limit risks associated with COVID-19. A Public Participation Plan was prepared and submitted to the DFFE in accordance with the DFFE requirements. Approval of the Plan was provided by the DFFE Case Officer via email on **15 September 2021** (refer to **Appendix B**).

The traditional means and opportunities available for the undertaking of public participation will still be covered and implemented as part of the public participation plan considering the current limitations. 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 an interactive web-based platform (i.e. online stakeholder engagement 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 C1**) considers the limitations applied by the Disaster Management Act Regulations prohibiting the gathering of people, as well as limitations which certain I&APs may have in terms of access to computers and internet as well as access to public spaces which may not be open for operation that inhibits access to hard copy documentation. The online stakeholder engagement platform implemented by Savannah Environmental for the project allowed the EAP to visually present details regarding the project as well as consultation documentation, including project maps and plans, presentations, and posters. The platform also 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 parties do not have access to electronic systems to access the project information, opportunity for them to engage with the project team is facilitated through alternative means, such as consultation with the Ward Councillor, community representatives or one-on-one engagement, where the relevant Regulations to minimise risks associated with COVID-19 can be adhered to.

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.
» 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, i.e., local language and technical issues, 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, SMS, WhatsApp or by sending a Please-call-me notification.
» An adequate review period is provided for I&APs to comment on the findings of the BA Report.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks are required to be 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.
    (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.
    (vii) any other party as required by the competent authority.
» Place an advertisement in one local newspaper and one regional newspaper.
» Open and maintain a register of I&APs and Organs of State.

- Release of a BA Report for a 30-day review and comment period.
- Prepare a Comments and Responses (C&R) Report which documents the comments received on the BA process and during the 30-day review and comment period and the responses provided by the project team.

In compliance with the requirements of Chapter 6: Public Participation of the EIA Regulations, 2014 (as amended), and the approved Public Participation Plan, the following summarises the key public participation activities implemented. The schematic below 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.

i. Stakeholder identification and register of I&APs	• Register as an I&AP on the online platform or 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 with a telephone call. • State interest in the project. • Receive all project related information via email, post or other appropriate means.
ii. Advertisments and notifications	• Advertisements, site notices and radio announcements and notifications provide information and details on the project and where to access project information. • Notifications regarding the BA process and availability of project report for public review to be sent via email, post or SMS notifications.
iii. Public Involvement and consultation	• Distribution of a BID providing details on the project and how I&APs can become involved in the process. • Submission of comments or queries via the online platform, email or post to the PP team. • Virtual presentations (both English and Afrikaans, and a summary of the presentation in Xhosa) available via the online platform. • Availability of project information via the online platform, email, post and telephonic platforms such as WhatsApp, and including telephonic discussions to provide description of information verbally. • An opportunity for I&APs and stakeholders to request virtual meetings with the project team.
iv. Comment on the BA Report	• Availability of the project report via the online platform for 30-day comment period. Hard copies to be available only where sanitary conditions can be assured. • Submission of comments via the online platform, email or 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 to be included in the reporting. • Comments received prior to report release for review to be included in the draft reports. • Comments received during full process to be included within the final Report for decision-making.

i. <u>Stakeholder identification and Register of Interested and Affected Parties</u>

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 surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders are required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via phone, message (SMS and WhatsApp), email or fax, or registering their interest via the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is listed in **Table 5.3**.

Table 5.3: Initial list of Stakeholders identified for inclusion in the project database during the public participation process for the Great Karoo EGI

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)
Government Bodies and State-Owned Companies
Air Traffic Navigation Services (ATNS)
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)
South African Radio Astronomy Observatory (SARAO)
Telkom SA SOC Limited
Transnet SA SOC Limited
Provincial Government Departments
Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR)
Northern Cape Department of Economic Development and Tourism
Northern Cape Department of Roads and Public Works
Ngwao Boswa Kapa Bokone (NBKB) – provincial Heritage Authority
CapeNature
Western Cape Department of Agriculture
Western Cape Department of Economic Development and Tourism
Western Cape Department Environmental Affairs and Development Planning
Western Cape Department of Transport and Public Works
Heritage Western Cape
Local Government Departments
Pixley Ka Seme District Municipality
Ubuntu Local Municipality – including the Ward Councillor, ward committee members, community representative or local community forum members
Central Karoo District Municipality
Beaufort West Local Municipality - including the Ward Councillor, ward committee members, community representative or local community forum members
Commenting Stakeholders

BirdLife South Africa
Endangered Wildlife Trust (EWT)
SENTECH
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

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 C2** 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[19] of:

- All persons who requested to be registered on the database through the use of the online stakeholder engagement platform or 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.
- All persons who submitted written comments or attended virtual meetings and viewed the narrated presentations on the Savannah Environmental online platform 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 47Dof 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 (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;

[19] 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).

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 (including occupiers) and general public to register as I&APs and to actively participate in the process. This was achieved via the following:

- Compilation of a background information document (BID) (refer to **Appendix C4**) providing technical and environmental details on the project and how to become involved in the BA process. The BID and the process notification letter announcing the BA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/IAPs of the proposed Great Karoo EGI, and providing background information of the project and inviting I&APs to register on the project's database were distributed via email on **21 October 2021**. Evidence of distribution is contained in **Appendix C** of the BA Report. The BID is also available electronically on the Savannah Environmental website (https://savannahsa.com/public-documents/grid-infrastructure/the-great-karoo-cluster-grid-connection-infrastructure/).
- Placement of site notices announcing the BA process at visible points along the boundary of the development area (i.e., the boundaries of the affected properties), in accordance with the requirements of the EIA Regulations on **28 – 30 September 2021**. Photographs of the site notices and the GPS co-ordinates of the locations where the site notices were placed are contained within **Appendix C3** of the BA Report.
- Placement of an advertisement in the De Aar Echo Newspaper (in English) on **23 September 2021** at the commencement of the BA process. This advert:
  - Announced the project and the associated BA process.
  - Provided details of how I&APs can become involved in the BA process, including details of the public participation consultant.
  - Provided all relevant details to access the Savannah Environmental online stakeholder engagement platform.

  A copy of the newspaper advert as sent to the newspaper and the advert tear sheet are included in **Appendix C3** of the BA Report.
- Placement of an advertisement in the De Aar Echo Newspaper (in English) on **13 May 20220.** This advert:
  - Announced the availability of the BA report, the review period, and where it is accessible for review, and invited comment on the BA Report,
  - Provided all relevant details to access the Savannah Environmental online stakeholder engagement platform.

  A copy of the newspaper advert as sent to the newspaper and the advert tear sheet are included in **Appendix C3** of the BA Report.
- A Live Read on RSG on **04 June 2022** at the commencement of the 30-day review and comment period (**Appendix C3**). Due to unavailability of airtime, earlier notifications could not have been broadcasted.
- The BA Report was made available for review by I&APs for a 30-day review and comment period from **20 May 2022** to **20 June 2022.** The BA Report was made available on the Savannah Environmental

website and all registered I&APs were notified of the availability on **13 May 2022** via email which included the link to access the report on the Savannah Environmental website (https://savannahsa.com/public-documents/grid-infrastructure/the-great-karoo-cluster-grid-connection-infrastructure/). The evidence of distribution of the BA Report is included in this final BA Report submitted to the DFFE for their decision making (refer to **Appendix C5** and **Appendix C6**).

iii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the surrounding 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 5.4: Public involvement for the Great Karoo EGI

Activity	Date
Announcement of the BA process in one local newspaper: » De Aar Echo Newspaper (English advertisement)	23 September 2021
Distribution of the BID, process notification letters and stakeholder reply form announcing the EIA process and inviting I&APs to register on the project database. The BID and electronic reply form was also made available on the online stakeholder engagement platform.	21 October 2021
Announcement of the availability of the BA Report for a 30-day review and comment period, including details on how to access the BA Report via the online stakeholder engagement platform, in one local newspaper: » De Aar Echo Newspaper (English advertisement)	13 May 2022
Radio Live Read by RSG regarding the BA Report comment period, and the details on how to get involved and how contact with Savannah Environmental can be made. A further radio live read segment will also broadcasted on RSG as a reminder of the availability of the BA Report for review and comment.	14 May 2022 and 04 June 2022
Distribution of notification letters announcing the availability of the BA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	13 May 2022
30-day review and comment period of the BA Report.	Friday, 20 May 2022 to Monday, 20 June 2022
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for	Various meetings were held during the 30-day review and comment period of the BA Report (refer to **Appendix C8** of the final BA Report for the meeting notes) as follows: » A virtual Focus Group Meeting (FGM) with District & Local Municipal Officials (Northern Cape Province and Western Cape Province) was held on **24 May 2022**.

Activity	Date
inclusion. The preferred language of the I&AP has been considered when setting up these discussions. » Face-to-face meetings could be held where sanitary conditions can be assured.	» A virtual FGM was held with the commenting authority Northern Cape Dept of Agriculture, Environmental Affairs, Rural Development and Land Reform and the Western Cape Department of Environmental Affairs & Development Planning Officials on **24 May 2022**. » A Key Stakeholder Workshop was held on **24 May 2022** to which all Organs of State and Key Stakeholders from the Northern Cape and Western Cape Provinces were invited. » A Poster Display and Public Meeting was held in Richmond Town Hall, Richmond, on **26 May 2022**. Community members and residents from Richmond was also notified of the poster display and public meeting by utilising the RICHMOND UBUNTU MATTERS WhatsApp group which consists of 60 participants.
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

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 were notified by means of a notification letter of the release of the BA Report for a 30-day review and comment 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 report was

made made available in soft copies to I&APs due to restrictions and limitations on public spaces during the national state of disaster related to COVID-19. No hard copies of the report were made available for review and comment in accordance with the approved public participation plan.

The BA Report was also made available on the Savannah Environmental website (i.e., online stakeholder engagement platform) (https://savannahsa.com/public-documents/grid-infrastructure/the-great-karoo-cluster-grid-connection-infrastructure/). The notification letter to all registered parties was distributed on **13 May 2022**. Where I&APs were not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions were used to provide the I&APs with a platform to verbally raise their comments on the proposed development.

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period have been recorded and included in **Appendix C9** of the BA Report.

v. Identification and Recording of Comments

Comments raised by I&APs to during the announcement of the BA process have been collated into a Comments and Responses (C&R) Report which is included in **Appendix C9** of the 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. The C&R Report has been updated with all comments received during the 30-day review and comment period and is included as **Appendix C9** in the final BA Report submitted to the DFFE for decision-making.

Meeting notes of all the telephonic discussions and virtual meetings conducted at the commencement of the BA process and during the 30-day review and comment period of the BA Report are included in **Appendix C8**.

5.4. Outcomes of the DFFE Web-Based Screening Tool

In terms of GNR 960 (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 applications in terms of Regulations 19 and 21 of the EIA Regulations.

The requirement for the submission of a Screening Report (included as **Appendix M** of the BA Report) for the Great Karoo EGI is applicable as it triggers Regulation 19 of the EIA Regulations, 2014 (as amended). **Table 5.5** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team considering the development area under consideration.

Table 5.5: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of the Great Karoo EGI

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating the need for the study)	Project Team Response
Agricultural Impact Assessment	High	The Soils, Land Use and Agriculture Impact Assessment is included in this BA Report as **Appendix G**.

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating the need for the study)	Project Team Response
Archaeological and Cultural Heritage Impact Assessment	Low	A Heritage Impact Assessment (which covers both archaeological and cultural aspects of the project site, development footprint and grid corridor) has been undertaken for the Great Karoo EGI and is included in this BA Report as **Appendix G**.
Palaeontology Impact Assessment	Very high	The Heritage Impact Assessment (included as **Appendix H** of the BA Report) includes an assessment of palaeontological resources within the project site, development footprint and grid corridor.
Terrestrial Biodiversity Impact Assessment	Very high	A Terrestrial Ecology Impact Assessment has been undertaken for the Great Karoo EGI and is included as **Appendix D** of the BA Report.
Freshwater Impact Assessment	Very high	A Freshwater Impact Assessment has been undertaken for the Great Karoo EGI and is included as **Appendix E** of the BA Report.
Plant Species Assessment	Medium	A Terrestrial Ecology Impact Assessment has been undertaken for the Great Karoo EGI and is included as **Appendix D** of the BA Report.
Animal Species Assessment	High	
Visual Impact Assessment	The screening report did not indicate a rating for this theme.	A Visual Impact Assessment has been undertaken for the Great Karoo EGI and is included in this BA Report as **Appendix I.** Site sensitivity verification as part of the visual impact assessment was undertaken through an on-site inspection of the grid connection corridor and substation development footprint. The on-site inspection identified sensitive visual receptors within 0 – 3km from the grid corridor and substation.
Social Impact Assessment	The screening report does not indicate a rating for this theme.	A Social Impact Assessment has been undertaken and is included in the BA Report as **Appendix J**. The sensitive receptors identified from a visual perspective are also applicable from a social perspective. The site sensitivity verification as part of the social impact assessment was also undertaken through an on-site inspection and consultations with the directly affected and adjacent landowners.
Avifauna Impact Assessment	The screening report did not indicate a rating for this theme.	An Avifauna Impact Assessment has been undertaken and is included in the BA Report as **Appendix F**.
Civil Aviation Assessment	Low	The Civil Aviation Authority will be consulted throughout the BA process to obtain input.
Defence Assessment	Low	The project site is not located within close proximity of any military base.

5.5. Assessment of Issues Identified through the BA Process

Issues identified as requiring investigation, as well as the specialist consultants involved in the assessment of these impacts are indicated in **Table 5.6** below.

Table 5.6: Specialist consultants appointed to evaluate the potential impacts associated with the Great Karoo EGI

Specialist	Field of Study	Appendix
David Hoare of David Hoare Consulting (Pty) Ltd	Terrestrial Ecology (including fauna and flora)	Appendix D
Andrew Husted and Ivan Baker of the Biodiversity Company	Freshwater, Soil, and Agricultural Potential	Appendix E and G
Chris van Rooyen of Chris van Rooyen Consulting	Avifauna	Appendix F
Jenna Lavin of CTS Heritage	Heritage (including Archaeology Palaeontology and Cultural Heritage)	Appendix H
Lourens du Plessis of LOGIS	Visual	Appendix I
Tony Barbour of Tony Barbour Environmental Consulting	Social	Appendix J

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the Great Karoo EGI. Issues 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).

Specialist studies also considered cumulative impacts associated with similar developments within a 30km radius of the proposed project. The purpose of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). In this regard, specialist studies considered whether the construction of the proposed development will result in:

» Unacceptable risk
» Unacceptable loss
» Complete or whole-scale changes to the environment or sense of place
» Unacceptable increase in impact

A conclusion regarding whether the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area is included in the respective specialist reports.

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. An assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. Environmental Management Programmes (EMPrs) that include all the mitigation measures recommended by the specialists for the management of significant impacts are included within this BA Report. The Generic Environmental Management programme (EMPr) for the Development and Expansion of Substation Infrastructure for the Transmission and Distribution of Electricity has been used for the central collector substation (refer to **Appendix O**). The Generic Environmental Management programme (EMPr) for the Development and Expansion of Overhead Power Line Infrastructure for the Transmission and Distribution of Electricity has been used for the 132kV double circuit power line (refer to **Appendix N**).

5.6 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 project site, grid corridor, and development footprint for the central collector substation identified by the developer represents a technically suitable site for the establishment of the Great Karoo EGI which is based on the design undertaken by technical consultants for the project.

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

5.7 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.
- Department of Environmental Affairs (2017), Integrated Environmental Management Guideline: Guideline on Need and Desirability.
- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation.
- 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 5.7 provides an outline of the legislative permitting requirements applicable to the Great Karoo EGI as identified at this stage in the project process.

Table 5.7: Applicable Legislation, Policies and/or Guidelines associated with the development of the Great Karoo EGI

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 developments 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. Considering the capacity of the proposed collector substation and power line which forms part of the Great Karoo EGI (i.e., 132kV) and the triggering of Activity 11	DFFE – Competent Authority Northern Cape DAEARD&LR – Commenting Authority Western Cape Government Environmental Affairs And Development Planning (Western Cape DEA & DP) – Commenting Authority	The listed activities triggered by the proposed project have been identified and assessed as part of the BA process for the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	of Listing Notice 1 (GNR 327), a BA process is required in support of the Application for EA.		
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 Northern Cape DAEARD&LR Western Cape DEA & DP	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
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 Northern Cape DAEARD&LR Ubuntu Local Municipality Western Cape DEA & DP Beaufort West Local Municipality	Noise impacts are expected to be associated with the construction and operation phases of the project. However, the impacts are expected to be negligible considering the proposed infrastructure.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
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 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)).	Regional Department of Water and Sanitation	Watercourses are present within the grid corridor and the footprint considered for the establishment of the central collector substation as identified in the Freshwater Impact Assessment (**Appendix E**). As a result, a water use authorisation for the project will be required from the DWS; however, the process will only be completed once a positive EA has been received and the project selected as Preferred Bidder by the DMRE or a private offtaker. This is in line with the requirements from the DWS.
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 of Mineral Resources and Energy (DMRE)	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 project, and as a result a mining permit or EA in this regard 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		In terms of Section 53 of the MPRDA, approval is required from the Minister of

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.		Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.
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.	Northern Cape DAEARD&LR / Pixley ka Seme District Municipality Western Cape DEA & DP/Central Karoo District	In the event that the project 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.
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.	South African Heritage Resources Agency (SAHRA) Ngwao Boswa Kapa Bokone (NBKB) – provincial heritage authority Heritage Western Cape – provincial heritage authority	A full Heritage Impact Assessment (HIA) (with field work) has been undertaken as part of the BA process (refer to **Appendix H** of this BA Report). Thirty (30) archaeological and heritage resources were identified during the survey of the grid connection corridor and substation footprint. All of the identified heritage resources are not considered to be conservation worthy. Furthermore, six (6) palaeontological heritage resources

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a 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.		were identified during the survey of the grid connection corridor and substation footprint. Should a heritage resource be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone or Heritage Western Cape in accordance with Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).
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), 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:	DFFE Northern Cape DAEARD&LR Western Cape DEA & DP	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. A Terrestrial Ecology Impact Assessment has been undertaken for the Great Karoo EGI (**Appendix D**). No plant species protected under the National Environmental Management: Biodiversity Act (No. 10 of 2004) were identified on site.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).		
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. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DFFE Northern Cape DAEAR&LR Western Cape DEA & DP	A Terrestrial Ecology Impact Assessment (**Appendix D**) was undertaken as part of the EIA process to identify any alien invasive plants present on site. No alien and invasive species listed under the Alien and Invasive Species List were recorded 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 GN R1048 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 GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.	Department of Agriculture, Land Reform and Rural Development (DALRD)	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 (GN R1048) 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.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			» 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. » 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".	Department of Agriculture, Land Reform and Rural Development (DALRD)	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 Terrestrial Ecology Impact Assessment undertaken as part of the EIA included the identification of any protected tree species which may require a license in terms of the NFA (No. 84 of 1998) within the development area (refer to **Appendix D** of this BA Report).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			No tree species protected under the National Forests Act (No. 84 of 1998) were identified within the grid connection corridor.
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.	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the Great Karoo EGI in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained 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	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		If applicable, a license would be required to be obtained from the DoH.
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.	DFFE – Hazardous Waste Northern Cape DAEARD&LR – General Waste Western Cape DEA & DP – General Waste	No waste listed activities are triggered by the Great Karoo EGI; 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. 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 person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented.		
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	South African National Roads Agency (SANRAL) – national roads Northern Cape Department of Transport, Safety and Liaison Western Cape Department of Transport and Public Works	An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally dimensioned loads and transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation and BESS components may not meet specified dimensional limitations (height and width) which will require a permit.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.		
	Provincial Policies / Legislation		
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	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.	Northern Cape DAEARD&LR	A collection/destruction permit must be obtained from Northern Cape DAEARD&LR for the removal of any protected plant or animal species found on site. Should these species be confirmed within the development footprint during any phase of the project, permits will be required. A Terrestrial Ecology Impact Assessment has been undertaken as part of the BA process (refer to **Appendix D**). There are a number of species recorded on site that are protected under the Northern Cape Nature Conservation Act No. 9 of 2009. It is a legal requirement to obtain a permit from the provincial authorities for the destruction of any of these species.
The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000)	The Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000) defines the protection status of plants as follows: * ''endangered flora'' means flora of any species which is in danger of extinction and is specified in Schedule 3 or Appendix I of the Convention on	Western Cape DEA & DP	Where protected plants are to be disturbed or destroyed by the development of grid connection infrastructure, the relevant permits need to be obtained.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973; provided that it shall not include flora of any species specified in such Appendix and Schedule 4; (therefore all Schedule 3 species) * ''protected flora'' means any species of flora specified in Schedule 4 or Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973; provided that it shall not include any species of flora specified in such Appendix and Schedule 3 * ''indigenous unprotected flora'' means any species of indigenous flora not specified in Schedule 3 or 4.		The Terrestrial Ecology Impact Assessment (**Appendix D**) did not identify any species protected in terms of the Nature and Environmental Ordinance 19 of 1974, (as amended by the Western Cape Nature Conservation Laws Amendment Act, Act 2 of 2000).

5.7.1 The IFC EHS Guidelines

The IFC EHS Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). The following IFC EHS Guidelines have relevance to the Great Karoo EGI:

- IFC EHS General Guidelines
- IFC EHS Guidelines for Electric Power Transmission and Distribution

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines. The application of the General EHS Guidelines should be tailored to the hazards and risks associated with a project and should take into consideration site-specific variables which may be applicable, such as host country context, assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

- Environmental:
  - Air Emissions and Ambient Air Quality
  - Energy Conservation
  - Wastewater and Ambient Water Quality
  - Water Conservation
  - Hazardous Materials Management
  - Waste Management
  - Noise
  - Contaminated Land
- Occupational Health and Safety:
  - General Facility Design and Operation
  - Communication and Training
  - Physical Hazards
  - Chemical Hazards
  - Biological Hazards
  - Radiological Hazards
  - Personal Protective Equipment (PPE)
  - Special Hazard Environments
  - Monitoring
- Community Health and Safety:
  - Water Quality and Availability
  - Structural Safety of Project Infrastructure
  - Life and Fire Safety (L&FS)
  - Traffic Safety
  - Transport of Hazardous Materials
  - Disease Prevention
  - Emergency Preparedness and Response
- Construction and Decommissioning:
  - Environment
  - Occupational Health & Safety
  - Community Health & Safety.

CHAPTER 6: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This Chapter provides a description of the local environment that may be affected by the development of the Great Karoo EGI. The information is provided in order to assist the reader in understanding the pre-development environment and the possible effects of the project on the environment within which it is proposed to be developed. Aspects of the biophysical and social and economic environment that could be directly or indirectly affected by the development or could affect proposed infrastructure 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.

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 EIA Regulations, 2014 (as amended) - Appendix 1: Content of Basic Assessment Reports.

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 project site as well as the broader environment, are described and considered within this chapter and include the following:
	The regional setting within which the project site is located is described in **section 6.2**.
	The climatic conditions of the area within which the project site is located is discussed in **section 6.3**.
	The biophysical characteristics of the project site and the surrounding areas are described in **section 6.4.** These include topography and terrain, geology, soils, and land types/agricultural potential and biodiversity (i.e., ecology ((including fauna & flora)), avifauna and aquatic features) of the area to be affected by the development of the proposed infrastructure.
	The heritage of the project site and the surrounding areas (including the archaeology, palaeontology and cultural landscape) is discussed in **section 5.5**.
	The visual quality of the affected area surrounding the project site is described in **section 6.5.**
	The social context within which the project site is located is described in **section 6.7**.

A more detailed description of each aspect of the affected environment is included in the specialist reports contained within **Appendix D – J**.

6.2 Regional Setting: Description of the Broader Study Area

The Great Karoo EGI is proposed to be located approximately 35km south-west of Richmond and 80km south-east of Victoria West, within the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province, on the following farm properties:

- Portion 0 of Farm Annex Rondavel 86;
- Portion 1of Farm Uit Vlugt Fontein 265;
- Portion 0 of Farm Wynandsfontein 91;
- Portion 1 of Farm Wynandsfontein 91;
- Portion 3 of Farm Vlekfontein 90;
- Portion 0 of Farm Burgersfontein 92;
- Portion 0 of Farm Niuewe Fontein 89;
- Portion 1 of Farm Nieuwe Fontein 89;
- Portion 0 of Farm Rondavel 85;
- Portion 1 of Farm Rondavel 85;
- Portion 0 of Farm Kleinfontein 93;
- Portion 1 of Farm Bult & Rietfontein 96; and
- Remaining extent of Portion 3 of Farm Schietkuil.

A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province.

Northern Cape Province

The Northern Cape is rich in minerals including alluvial diamonds, iron ore, asbestos, manganese, fluorspar, semi-precious stones and marble. The mining sector in the province is the largest contributor of the provincial Gross Domestic Product (GDP) and of a great importance to South Africa as it produces ~37% of the country's diamonds, 44% of its zinc, 70% of its silver, 84% of its iron ore, 93% of its lead and 99% of its manganese.

The province has fertile agricultural land in the Orange River Valley, especially at Upington, Kakamas and Keimoes, where grapes and fruit are cultivated intensively. The interior Karoo relies on sheep farming, while the karakul-pelt industry is one of the most important in the Gordonia District of Upington. Wheat, fruit, peanuts, maize, and cotton are produced at the Vaalharts Irrigation Scheme near Warrenton. The agricultural sector employs approximately 19.5% of the total formally employed individuals. The sector is also experiencing significant growth in value-added activities, including game-farming, while food production and processing for the local and export markets is also growing significantly (PGDS, July 2011). Furthermore, approximately 96% of the land in the province is used for livestock and game farming, while only approximately 2% is used for crop farming, mainly under irrigation in the Orange River Valley and the Vaalharts Irrigation Scheme.

The Northern Cape offers unique tourism opportunities including wildlife conservation destinations, natural features, historic sites, festivals, cultural sites, star gazing, adventure tourism, agricultural tourism, ecotourism, game farms, and hunting areas, etc. The province is home to the Richtersveld Botanical and Landscape World Heritage Site, which comprises a United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site under the World Heritage Convention. The province also includes to two (2) Transfrontier National Parks, namely the Kgalagadi Transfrontier Park, and the Richtersveld /Ai-Ais Transfrontier Park, as well as five (5) national parks and six (6) provincial reserves. In addition, the province plays a significant role in South Africa's science and technology sector, as it is home to the Square Kilometre Array (SKA), the Southern African Large Telescope (SALT), and the Karoo Array Telescope (MeerKAT). In addition, the Augrabies National Park, a major tourist destination in the province is located 120km east of Upington near the town of Kakamas.

The capital city of the Northern Cape Province is Kimberley. Other important towns include Upington, Springbok, Kuruman and De Aar. The province is rich in minerals and has fertile agricultural land in the Orange River Valley. The interior Karoo relies on sheep farming, while the karakul-pelt industry is one of the most important in the Gordonia District of Upington. The Northern Cape Province comprises five district municipalities, namely, Francis Baard, John Taolo Gaetsewe, Namakwa, Pixley ka Seme, and ZF Mgcawu, which contain twenty-six local municipalities collectively (refer to **Figure 6.1**).

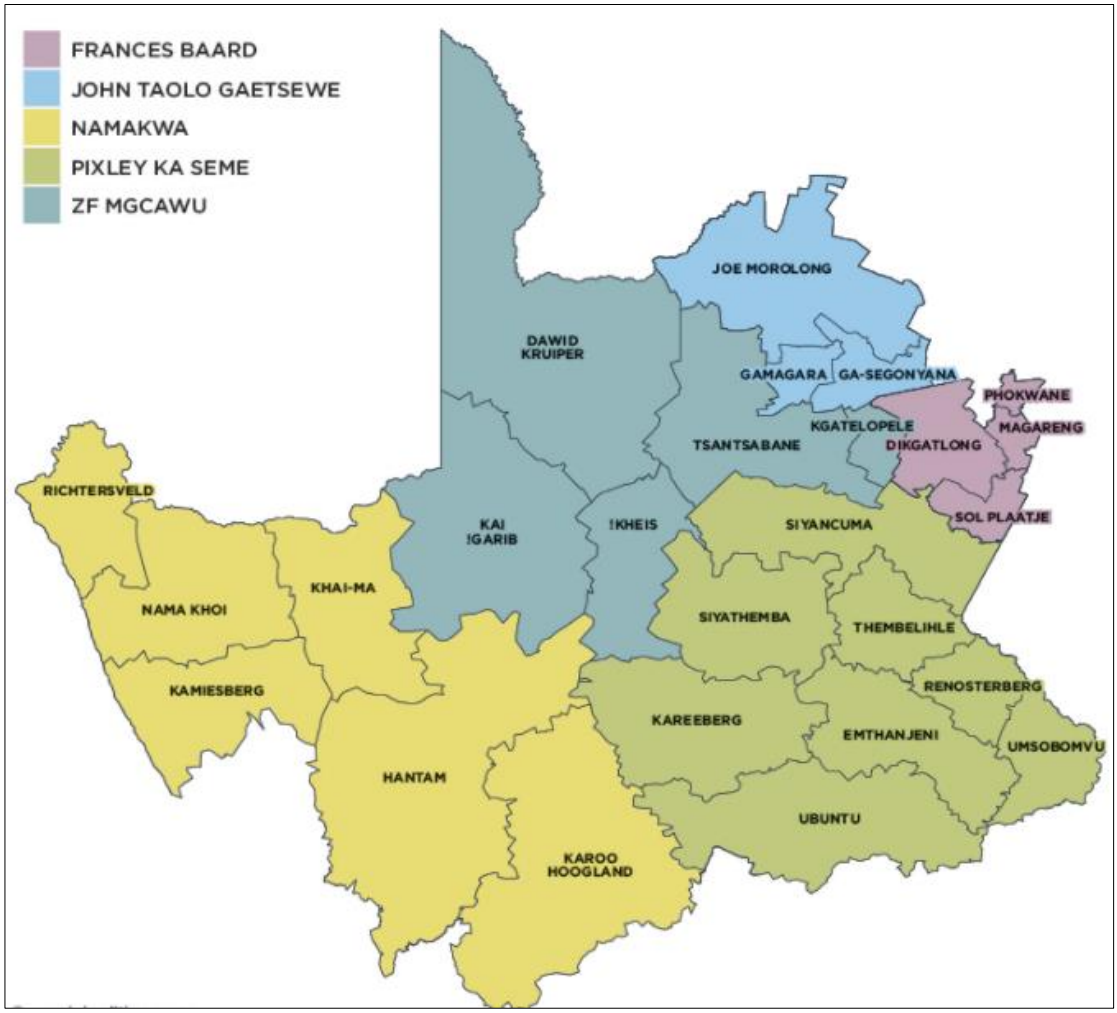


Figure 6.1: District municipalities of the Northern Cape Province (Source: Municipalities of South Africa).

Pixley Ka Seme District Municipality

The Pixley ka Seme District Municipality is a Category C municipality situated in the south-east of the Northern Cape Province. It shares its border with three other provinces, namely, the Free State to the east, the Eastern Cape to the south-east, and the Western Cape to the south-west. The Pixley ka Seme District Municipality covers an area of ~ 103 411km², making it the second-largest district of the five in the province. Two of the major dams in South Africa, the Vanderkloof and Gariep Dams, are situated on the borders of the district municipality. The Pixley ka Seme District Municipality comprises eight local municipalities, namely, Ubuntu, Umsobomvu, Emthanjeni, Kareeberg, Renosterberg, Thembelihle, Siyathemba and Siyancum (refer to **Figure 6.2**). Its main town is De Aar. According to StatsSA 2011 and the Community Survey 2016, the Pixley ka Seme District Municipality's population sits at 195 595. The main economic sectors in the Pixley ka Seme District Municipality are community services (26.6%), agriculture (16.6%), transport (15.1%), trade (12.9%), finance (12.8%), electricity (7.0%), construction (3.3%), manufacturing (3.2%), and mining (2.6%).

Figure 6.2: Local Municipalities of the Pixley Ka Seme District Municipality (Source: Municipalities of South Africa)

Ubuntu Local Municipality

The broader project site for the establishment of the Angora Wind Farm and associated infrastructure is located within the Ubuntu Local Municipality. The Ubuntu Local Municipality is a Category B municipality within the Pixley Ka Seme District in the Northern Cape Province. It is bordered by Kareeberg and Emthanjeni in the north, the Western Cape and Eastern Cape Provinces in the south, the Eastern Cape in the east, and the Namakwa District in the west. The Ubuntu Local Municipality covers an area of ~ 20 393km², making it the largest of the eight local municipalities that make up the district. Cities and/or towns within the municipality include Hutchinson, Loxton, Richmond and Victoria West. The agricultural sector is the main economic sector in the Ubuntu Local Municipality. According to census 2011, the population of the Ubuntu Local Municipality grew from 16 375 in 2001 to 18 601 in 2001, indicating an annual population growth rate of 1.6%.

Western Cape Province

The Western Cape is located on the southern tip of the African continent between the Indian and Atlantic Oceans. It is bordered by the Northern Cape and Eastern Cape provinces. The region is topographically and climatically diverse. It has a temperate southern coastline fringed with mountains. To the north it stretches deep into the Karoo plateau, while the west coast is extremely dry.

The Western Cape is the fourth-largest province in South Africa and covers an area of 129 462km² and also ranks fourth in population with a population of 6 279 730. The capital city is Cape Town. Other major cities and towns include George, Knysna, Paarl, Swellendam, Oudtshoorn, Stellenbosch, Worcester, Mossel Bay and Strand.

Fisheries and agriculture are abundant in the province. Fishing is the most important industry along the west coast. The province has a well-established industrial and business base, and the lowest unemployment rate in the country. Many the country's petroleum companies are located in Cape Town.

The Western Cape is divided into one metropolitan municipality (City of Cape Town Metropolitan Municipality) and five district municipalities, which are further subdivided into 24 local municipalities. (refer to **Figure 6.3**).

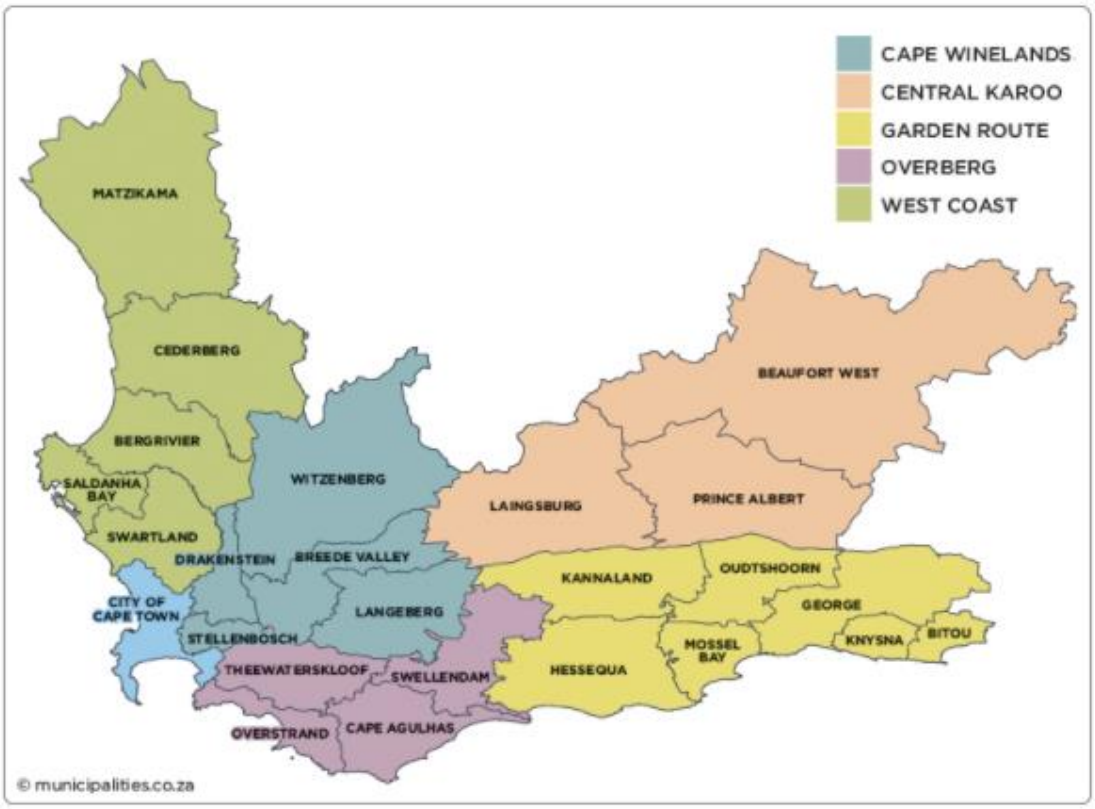


Figure 6.3: Districts of the Western Cape Province (Source: Municipalities of South Africa)

Central Karoo District Municipality

The Central Karoo District Municipality is a Category C municipality located within the Western Cape Province that covers an area of 38 854km² (refer to **Figure 6.4**). It is bordered by the Pixley Ka Seme District Municipality in the north, Namakwa District Municipality in the north-west, Garden Route District Municipality in the south, Sarah Baartman District Municipality in the east and Cape Winelands District Municipality in the west. Central Karoo is the largest district in the Western Cape Procince, making up a third of its geographical area. It is comprised of three local municipalities: Laingsburg, Prince Albert and Beaufort West. The seat of the district is Beaufort West. Main economic sectors in the district include agriculture (47%), finance and business services (22%), community services (19%), and construction (7%).

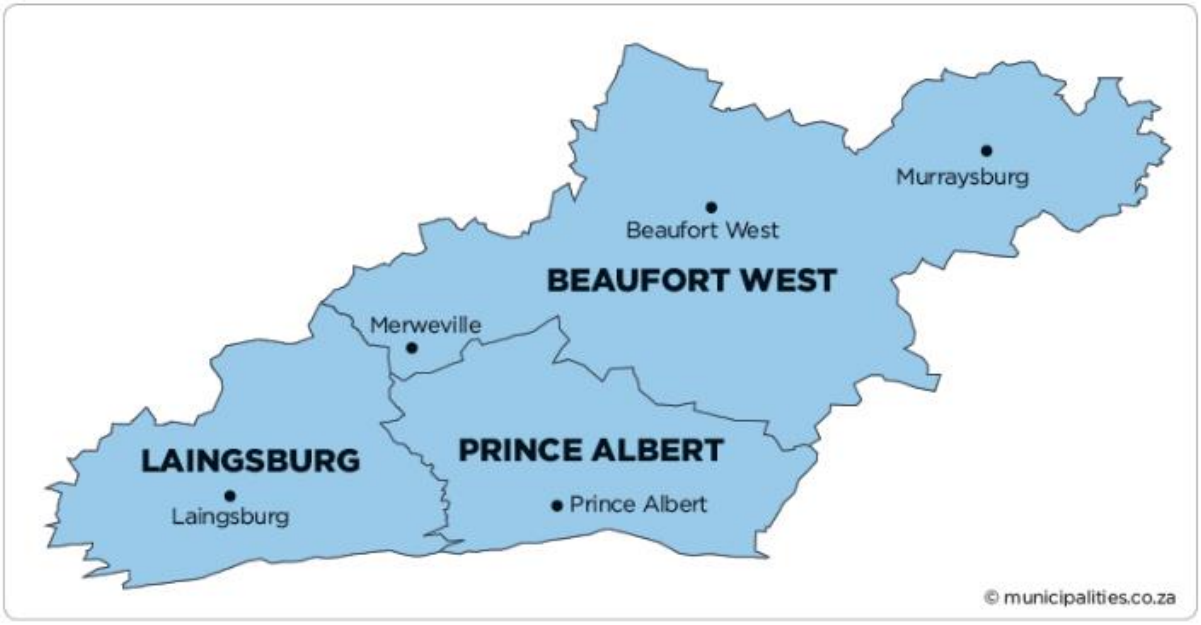


Figure 6.4: Local municipalities within the Central Karoo District (Source: Municipalities of South Africa)

Beaufort West Local Municipality

The Beaufort West Local Municipality is a Category B municipality located within the Central Karoo District in the Western Cape Province. It is bordered by the Northern Cape to the north and west, Prince Albert to the south, and the Eastern Cape to the east. It is the largest municipality of three in the district, making up more than half its geographical area (21 917km²). Cities/towns that make up the local municipality area Beaufort West, Merweville, Murraysburg, and Nelspoort. The main economic sectors in the municipality include community services (29.1%), transport (17.0%), trade (14.0%), and finance (13.5%)

Project Site

Areas surrounding the project site are generally sparsely populated, with the highest concentration of people living in the town of Richmond (5 122). The project site and the areas surrounding the site consist of a landscape that can be described as remote due to its considerable distance from any major metropolitan centres or populated areas. The scarcity of water and other natural resources has influenced settlement within this region, keeping numbers low, and distribution limited to the availability of water. Settlements, where they occur, are usually rural homesteads or farm dwellings. The grid infrastructure is proposed adjacent to the N1, which provides access to the site. The R63 is located to the south-west of the project site. The gravel main access road which is bisected by the project site provides direct access to the EGI and will therefore be utilised for accessing the project site (refer to **Figure 6.5**).

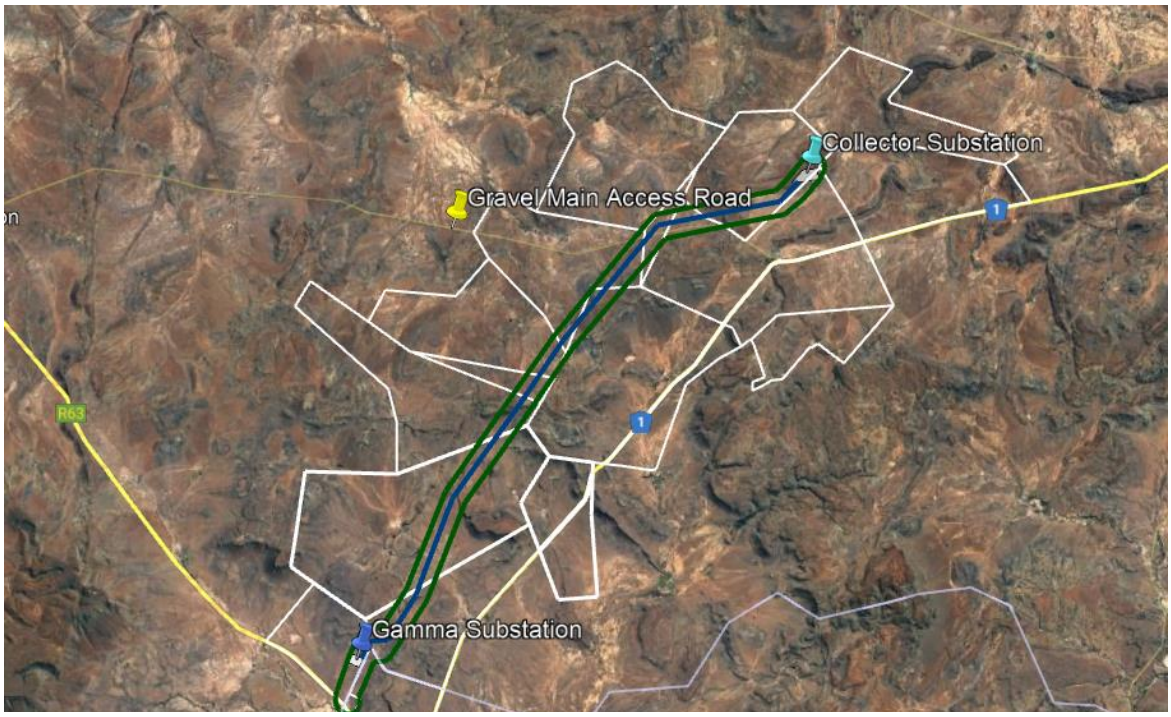


Figure 6.5: Location of the Great Karoo EGI in relation to the gravel main access road that bisects the project site and provides direct access to the EGI

6.3 Climatic Conditions

The region within which the project site is located is relatively dry. Rainfall occurs mainly in Summer and Autumn, peaking in March, with a Mean Annual Precipitation (MAP) ranging from 180 to 430mm (from west to east respectively). The area is characterised by a high frost occurrence rate ranging from just below 30 to 80 days per year. The mean minimum and maximum temperatures in the area are -7.2℃ and 36.1℃ for July and January, respectively (also see **Figure 6.6** for more information).

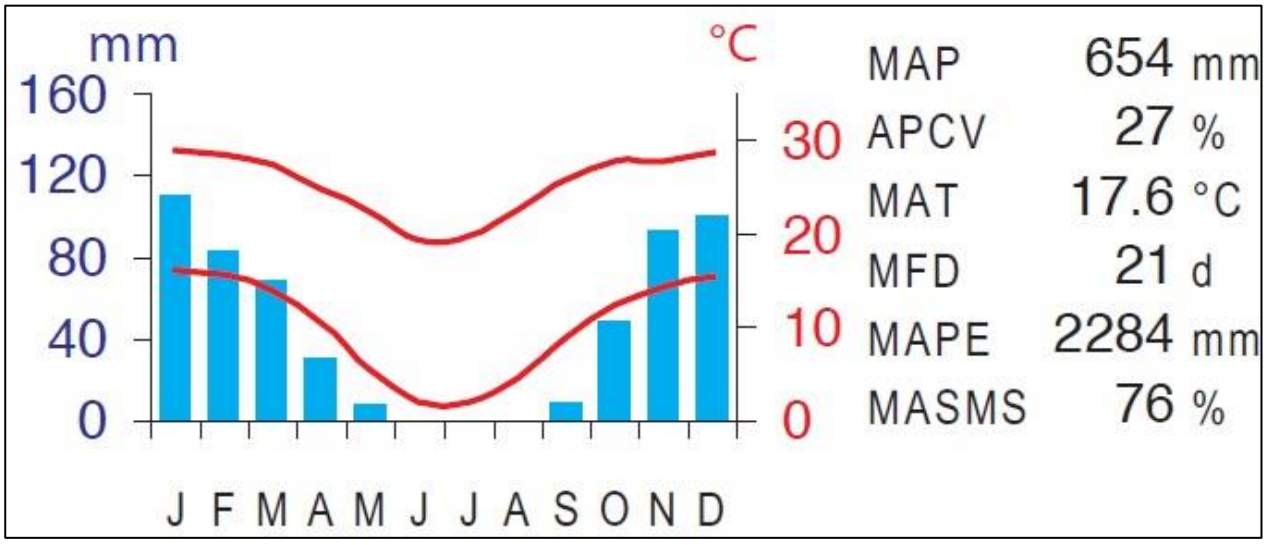


Figure 6.6: Climatic graph for Richmond area, Northern Cape within which the proposed project site is located

6.4 Biophysical Characteristics of the Study Area

6.4.1 Topographical Profile

The study area occurs on land that ranges in elevation from approximately 1 170m above sea level (in the south-western corner of the study area) to 1 830m (at the top of the mountains to the east). The terrain along the proposed alignment is predominantly flat with some hills and ridges occurring predominantly to the south of the alignment. Two of the larger hills, or small mountains, are the Blouberg and the Platberg. Other mountains and hills in closer proximity to the alignments include Bobbejaankrans, Bulberg, Kamberg and Kromhoek se Berg.

The proposed alignment will traverse from 1 358m (the substation site) to 1 225m above sea level at the Gamma MTS. The overall terrain morphological description of the study area is described as *undulating plains* (lowlands), with *ridges*, *hills* and *mountains*. These hills and mountains are often referred to as *inselbergs* (island mountains) due to their isolated nature, or *mesas* (table mountains) due to their flat-topped summits.

The slope percentage of the project area has been calculated and is illustrated in **Figure 6.7**. Most of the project area is characterised by a slope percentage between 0 and 20%, with some smaller patches within the project area characterised by a slope percentage up to 64%. This illustration indicates a non-uniform topography with alternating hills and steep cliffs surrounding flatter areas.

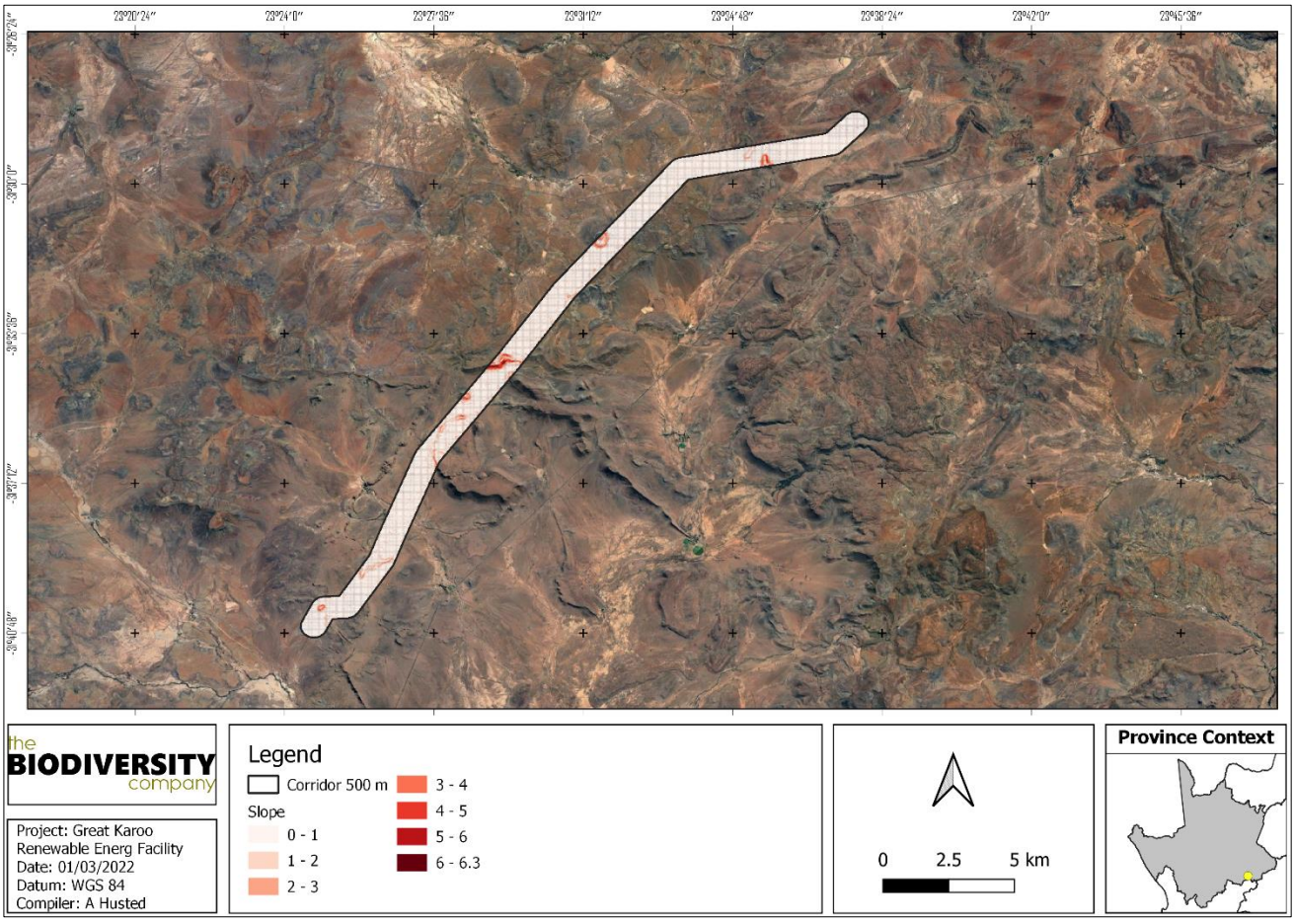


Figure 6.7: The slope percentage calculated for the project area

6.4.2 Geology, Land Type and Soils

Geological Setting

The geology of the study area is characterised by sandstones and mudstones from the Beaufort Group (including the Tarkastad and Adelaide Subgroups) (refer to **Figure 6.8**) which supports pedocutanic and prismacutanic diagnostic horizons. The Beaufort Group sediments are known to preserve diverse terrestrial and freshwater tetrapods of *Tapinocephalus* to *Lystrosaurus Biozones* (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways) and sparse vascular plants (*Glossopteris Flora*, including petrified wood).

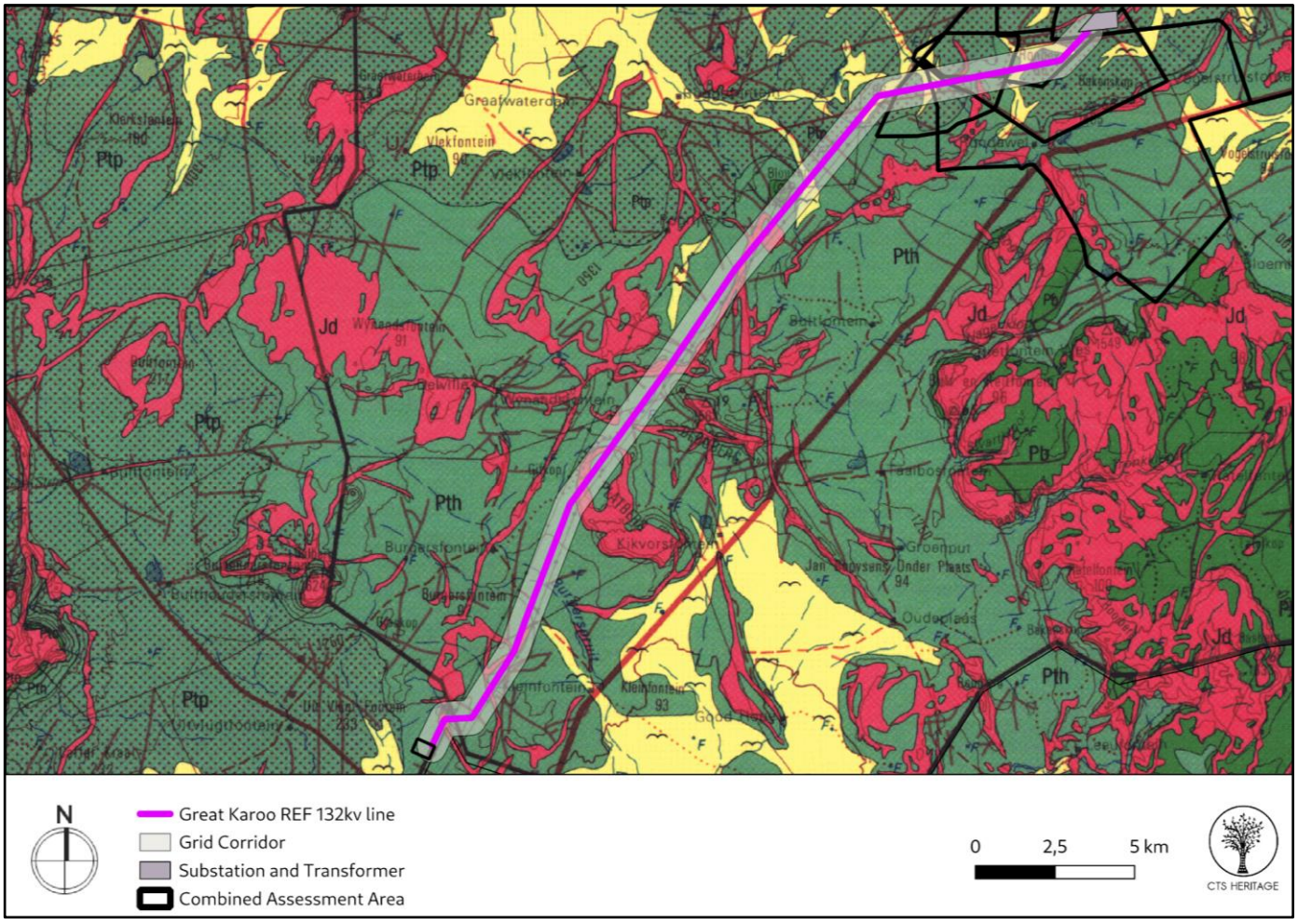


Figure 6.8: Extract from the CGS 3122 Victoria West Map indicating that the development area for the WEF development is underlain by sediments of Ptp: Poortjie Member and Pth: Hoedemaker Member of the Teekloof Formation of the Adelaide Subgroup and Jd: Jurassic Dolerite as well as Quaternary Sands

Land Types

According to the land type database, the project area is characterised by the Da 76, Da 147, Fb 485, Fb 488, Ib 397 land types (refer to **Figure 6.9**). The Da land type is characterised by prismacutanic and/or pedocutanic horizons with the possibility of red apedal B-horizons occurring. The Fb land type consists of Glenrosa and/or Mispah soil forms with the possibility of other soils occurring throughout. Lime is generally

present within the entire landscape. The Ib land type consists of miscellaneous land classes, including rocky areas with miscellaneous soils.

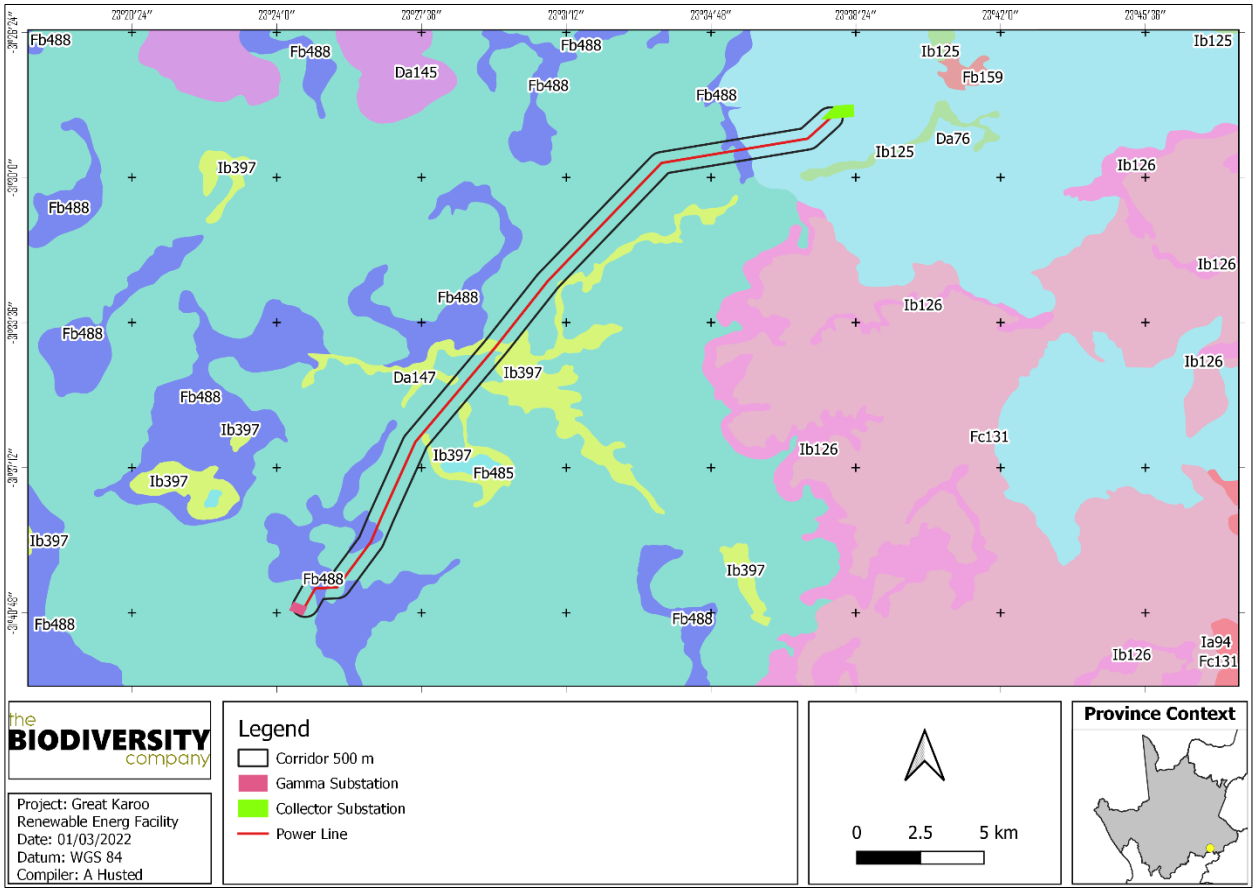


Figure 6.9: Land types present within the project area

Soil Forms

Various soil forms were identified throughout the project area, on which only the most sensitive soil forms will be focussed on, namely the Tubatse, Oakleaf and Bethesda soil forms (refer to **Figure 6.10**). These soil forms are characterised by an orthic topsoil on top of a neocutanic horizon. The Tubatse and Bethesda soil forms are characterised by a lithic and hard rock horizon underneath the neocutanic horizons respectively with the Oakleaf being characterised by a deep neocutanic horizon.

Orthic topsoils are mineral horizons that have been exposed to biological activities and varying intensities of mineral weathering. The climatic conditions and parent material ensure a wide range of properties differing from one orthic topsoil to another (i.e., colouration, structure etc). The neocutanic horizon is associated with recent depositions and unconsolidated soils. Any soil form can develop out of a neocutanic horizon, depending on the climatic and topographical conditions). Some properties pertaining to other diagnostic soil horizons will be present within a Neocutanic horizon but will lack main properties necessary to classify the relevant soil type.

For the Lithocutanic horizon, *in situ* weathering of rock underneath topsoil results in a well-mixed soil-rock layer. The colour, structure and consistency of this material must be directly related to the parent material of the weathered rock. The Lithocutanic horizon is usually followed by a massive rock layer at shallow depths. Hard rock, permeable rock and horizontally layered shale usually is not associated with the weathering

processes involved with the formation of this diagnostic horizon. The hard rock layer disallows infiltration of water or root systems and occur in shallow profiles. Horizontally layered, hard sediments without evidence of vertical seems fall under this category.

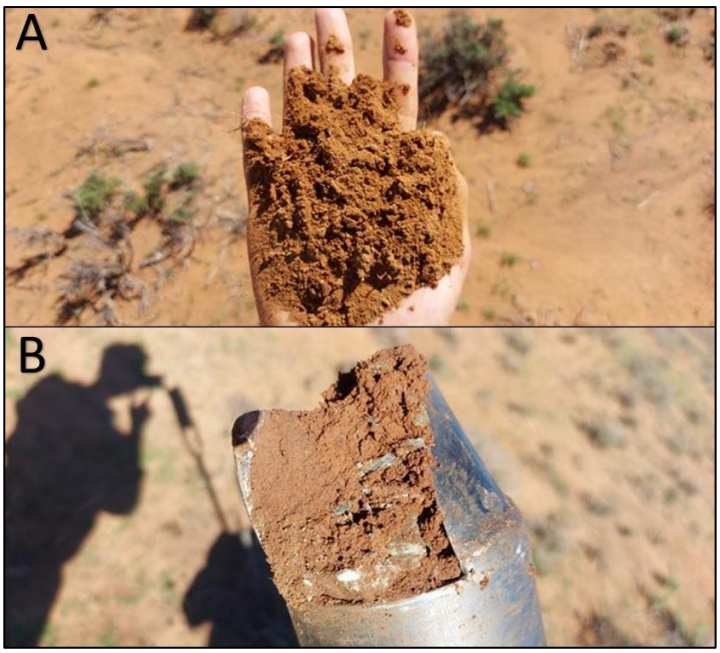


Figure 6.10: Examples of soil horizons identified on-site. A) Neocutanic horizon. B) Transition between neocutanic and lithic horizon

6.4.3 Land Capability and Land Potential of the Project Site

Land capability is defined by the most intensive long-term sustainable use of land under rain-fed conditions. According to Smith (2006), land capability is divided into eight classes, and these may be divided into three capability groups, namely, arable land (land capability class 1 -2), grazing land (land capability class 3 -6) and wildlife (land capability class 7 -8).

DAFF (2017) classifies land capability into fifteen different categories, which indicates the national land capability category and associated sensitivity related to soil resources. Given the fact that ground truthing and DSM exercises have indicated anomalies in the form of high sensitivity soil resources (which was not indicated by the DAFF (2017) raster file), the ground-truthed baseline delineations and sensitivities were used for this assessment rather than that of DAFF.

The land capability of the above-mentioned soils has been determined to be class "III" and the climatic capability has been determined to be level 8 given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. According to DAFF (2017), eight potential land capability classes are located within the proposed footprint area's assessment corridor, including:

» Land Capability 1 to 5 (Very Low to Low); and
» Land Capability 6 to 8 (Low/Moderate to Moderate Sensitivity).

The land potential classes are determined by combining the land capability results and the climate capability of a region. The final land potential results are then described in **Table 6.1**. These land potential classes are regarded as the final delineations subject to sensitivity, given the comprehensive addition of

climatic conditions as those relevant to the DAFF (2017) land capabilities. The main contributors to the climatic conditions as per Smith (2006) is that of Mean Annual Precipitation (MAP), Mean Annual Potential Evaporation (MAPE), mean September temperatures, mean June temperatures and mean annual temperatures. These parameters will be derived from Mucina and Rutherford (2006) for each vegetation type located within the relevant project area.

Table 6.1: Land potential classes

Land potential	Description of land potential class
L1	Very high potential: No limitations. Appropriate contour protection must be implemented and inspected.
L2	High potential: Very infrequent and/or minor limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L3	Good potential: Infrequent and/or moderate limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L4	Moderate potential: Moderately regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall. Appropriate permission is required before ploughing virgin land.
L5	Restricted potential: Regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall.
L6	Very restricted potential: Regular and/or severe limitations due to soil, slope, temperatures or rainfall. Non-arable
L7	Low potential: Severe limitations due to soil, slope, temperatures or rainfall. Non-arable
L8	Very low potential: Very severe limitations due to soil, slope, temperatures or rainfall. Non-arable

The following land potential level has been determined for the project area:

» Land potential level 6 (this land potential level is characterised by very restricted potential. Regular and/or severe limitations are expected due to soil, slope, temperatures or rainfall. This land potential is regarded as non-arable.

6.4.4 Land Use

The predominant land use in the area is stock farming (predominantly sheep, game, or goat farming). Since rainfall is low and water is scarce, crop farming accounts for only a small portion of the land use and is largely confined to the more fertile floodplain valleys. Due to the low carrying capacity, farms are large and usually at least about 5km apart.

The N1 national road provides motorised access to the region and the proposed development site. This road is the connecting spine in between the Gauteng Province and Cape Town and is frequented by both tourists visiting the Western Cape Province and freight carriers transporting goods in between these two destinations. Other arterial or main roads within the study area include the R63 (near the Gamma MTS) and the R398 near Richmond.

There are no designated protected areas within the region and no major tourist attractions or destinations were identified within the study area. There are however two overnight facilities, namely the Bloemhof Karoo Farmstay and the Rondawel Guest Farm. The former facility appears to be located on the farm identified for the Angora Wind Farm.

In spite of the rural and natural character of the area within which the project site is proposed, there are a large number of overhead power lines, all congregating at either the Gamma or Victoria Cap Substations. These include, Droërivier/Hydra 1, 2 & 3 400kV; Gamma/Hydra 1 765kV; and Gamma/Perseus 1 765kV. These power lines traverse the north-western boundary of the proposed development area. Additional power lines to the north-west of the study area (at the Brakpoort Substation) include the Brakpoort/Hutchinson 1 132kV and Brakpoort/Laken 1 132kV lines.

6.4.6 Ecological Profile of the Broader Study Area and Project Site

i. Broad-Scale Vegetation Patterns and Conservation Status

The national vegetation map for the project site is depicted in **Figure 6.11**. The grid connection infrastructure is mapped as falling within two vegetation types, namely, the Eastern Upper Karoo, and the Upper Karoo Hardeveld, which is associated with low mountains. The vegetation types that occur within the project site are briefly described below.

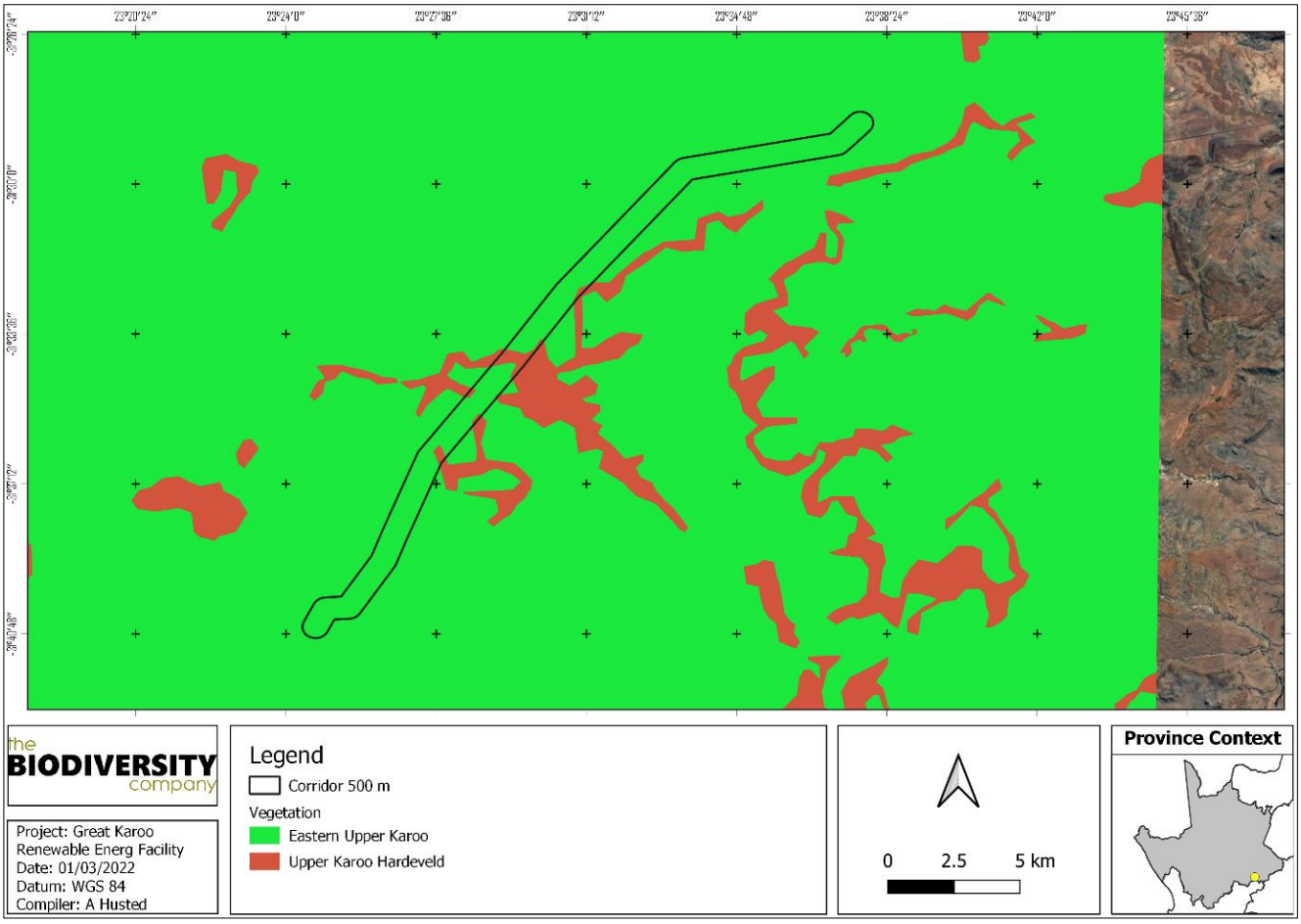


Figure 6.11: National vegetation map of the project site showing that the Great Karoo EGI falls within the Eastern Upper Karoo and the Upper Karoo Hardeveld vegetation types.

Upper Karoo Hardeveld (NKu2)

Distribution:
Northern, Western and Eastern Cape Provinces: Discrete areas of slopes and ridges including dolerite dykes and sills in the region spanning Middelpos in the west and Strydenburg, Richmond and Nieu-Bethesda in the

east. Most crest areas and steep slopes of the Great Escarpment facing south between Teekloofpas (connecting Leeu-Gamka and Fraserburg) and eastwards to Graaff-Reinet. Altitude varies mostly from 1 000–1 900m.

Vegetation and Landscape Features:
Steep slopes of koppies, butts, mesas and parts of the Great Escarpment covered with large boulders and stones supporting sparse dwarf Karoo scrub with drought-tolerant grasses of genera such as *Aristida, Eragrostis* and *Stipagrostis*.

- Important Taxa:

» **Tall Shrubs:** *Lycium cinereum* (d), *Rhigozum obovatum* (d), *Cadaba aphylla*, *Diospyros austro-africana*, *Ehretia rigida* subsp. *rigida*, *Lycium oxycarpum*, *Melianthus comosus*, *Rhus burchellii*.

» **Low Shrubs**: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *Euryops lateriflorus* (d), *Felicia muricata* (d), *Limeum aethiopicum* (d), *Pteronia glauca* (d), *Amphiglossa triflora*, *Aptosimum elongatum*, *A. spinescens*, *Asparagus mucronatus*, *A. retrofractus*, *A. striatus*, *A. suaveolens*, *Eriocephalus spinescens*, *Euryops annae*, *E. candollei, E. empetrifolium, E. nodosus, Felicia filifolia* subsp. *filifolia*, *Garuleum latifolium*, *Helichrysum lucilioides*, *H. zeyheri*, *Hermannia filifolia* var. *filifolia*, *H. multiflora*, *H. pulchella*, *H. vestita*, *Indigofera sessilifolia*, *Jamesbrittenia atropurpurea*, *Lessertia frutescens*, *Melolobium candicans*, *M. microphyllum*, *Microloma armatum*, *Monechma incanum*, *Nenax microphylla*, *Pegolettia retrofracta*, *Pelargonium abrotanifolium*, *P. ramosissimum*, *Pentzia globosa*, *P. spinescens*, *Plinthus karooicus*, *Polygala seminuda*, *Pteronia adenocarpa*, *P. sordida*, *Rosenia humilis*, *Selago albida*, *Solanum capense*, *Sutera halimifolia*, *Tetragonia arbuscula*, *Wahlenbergia tenella*.

» **Succulent Shrubs:** *Aloe broomii*, *Drosanthemum lique*, *Faucaria bosscheana*, *Kleinia longiflora*, *Pachypodium succulentum*, *Trichodiadema barbatum*, *Zygophyllum flexuosum*.

» **Semiparasitic Shrub**: *Thesium lineatum* (d). Herbs: *Troglophyton capillaceum* subsp. *capillaceum*, *Dianthus caespitosus* subsp. *caespitosus*, *Gazania krebsiana*, *Lepidium africanum* subsp. *africanum*, *Leysera tenella*, *Pelargonium minimum*, *Sutera pinnatifida*, *Tribulus terrestris*.

» **Geophytic Herbs:** *Albuca setosa*, *Androcymbium albomarginatum*, *Asplenium cordatum*, *Boophone disticha*, *Cheilanthes bergiana*, *Drimia intricata*, *Oxalis depressa*, Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Cenchrus ciliaris* (d), *Enneapogon desvauxii* (d), *Eragrostis lehmanniana* (d), *E. obtusa* (d), *Sporobolus fimbriatus* (d), *Stipagrostis obtusa* (d), *Cynodon incompletus*, *Digitaria eriantha*, *Ehrharta calycina*, *Enneapogon scaber*, *E. scoparius*, *Eragrostis curvula*, *E. nindensis, E. procumbens*, *Fingerhuthia africana*, *Heteropogon contortus*, *Merxmuellera disticha*, *Stipagrostis ciliata*, *Themeda triandra*, *Tragus berteronianus*, *T. koelerioides*.

Endemic Taxa:

» **Succulent Shrubs**: *Aloe chlorantha*, *Crassula barbata* subsp. *broomii*, *Delosperma robustum, Sceletium expansum*, *Stomatium suaveolens*.

» **Low Shrubs**: *Cineraria polycephala*, *Euryops petraeus*, *Lotononis azureoides*, *Selago magnakarooica*.

» **Tall Shrub**: *Anisodontea malvastroides*.

» **Herbs**: *Cineraria arctotidea*, *Vellereophyton niveum*. **Succulent Herbs**: *Adromischus fallax*, *A. humilis*.

» **Geophytic Herbs**: *Gethyllis longistyla*, *Lachenalia auriolae, Ornithogalum paucifolium* subsp. *karooparkense*.

Eastern Upper Karoo (NKu4)

Distribution:
Northern Cape, Eastern Cape and Western Cape Provinces: Between Carnarvon and Loxton in the west, De Aar, Petrusville and Venterstad in the north, Burgersdorp, Hofmeyr and Cradock in the east and the Great Escarpment and the Sneeuberge-Coetzeesberge mountain chain in the south. Altitude varies between mostly 1 000–1 700 m.

Vegetation and Landscape Features:
Flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast), dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast.

Important Taxa:
- **Tall Shrubs**: *Lycium cinereum* (d), *L. horridum*, *L. oxycarpum*.
- **Low Shrubs**: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *E. spinescens* (d), *Pentzia globosa* (d), *P. incana* (d), *Phymaspermum parvifolium* (d), *Salsola calluna* (d), *Aptosimum procumbens*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *H. lucilioides*, *Limeum aethiopicum*, *Nenax microphylla*, *Osteospermum leptolobum*, *Plinthus karooicus*, *Pteronia glauca*, *Rosenia humilis*, *Selago geniculata*, *S. saxatilis*.
- **Succulent Shrubs**: *Euphorbia hypogaea*, *Ruschia intricata*.
- **Herbs**: *Indigofera alternans*, *Pelargonium minimum*, *Tribulus terrestris*.
- **Geophytic Herbs**: *Moraea pallida* (d), *Moraea polystachya*, *Syringodea bifucata*, *S. concolor*.
- **Succulent Herbs**: *Psilocaulon coriarium*, *Tridentea jucunda, T. virescens.*
- **Graminoids**: *Aristida congesta* (d), *A. diffusa* (d), *Cynodon incompletus* (d), *Eragrostis bergiana* (d), *E. bicolor* (d), *E. lehmanniana* (d), *E. obtusa* (d), *Sporobolus fimbriatus* (d), *Stipagrostis ciliata* (d), *Tragus koelerioides* (d), *Aristida adscensionis*, *Chloris virgata*, *Cyperus usitatus*, *Digitaria eriantha*, *Enneapogon desvauxii*, *E. scoparius*, *Eragrostis curvula*, *Fingerhuthia africana*, *Heteropogon contortus*, *Sporobolus ludwigii*, *S. tenellus*, *Stipagrostis obtusa*, *Themeda triandra*, *Tragus berteronianus*.

Endemic Taxa:
- **Succulent Shrubs:** *Chasmatophyllum rouxii*, *Hertia cluytiifolia*, *Rabiea albinota*, *Salsola tetrandra*.
- **Tall Shrub:** *Phymaspermum scoparium*.
- **Low Shrubs:** *Aspalathus acicularis* subsp. *planifolia*, *Selago persimilis*, *S. walpersii*.

On the basis of a scientific approach used at national level by the South African National Biodiversity Institute (SANBI), vegetation types can be categorised according to their conservation status which is, in turn, assessed according to the degree of transformation relative to the expected extent of each vegetation type. The status of a habitat or vegetation type is based on how much of its original area still remains intact relative to various thresholds. On a national scale the thresholds are as depicted in **Table 6.2** below, as determined by best available scientific approaches. The level at which an ecosystem becomes Critically Endangered differs from one ecosystem to another and varies from 16% to 36%.

Table 6.2: Conservation status of different vegetation types occurring in the project site

Vegetation Type	Target (%)	Conserved (%)	Transformed (%)	Conservation status	
				Driver *et al.* 2005; Mucina *et al.*, 2006	**National Ecosystem List (NEM:BA)**
Eastern Upper Karoo	21	0.7	2	Least Threatened	Not listed
Upper Karoo Hardeveld	21	2.9	<1	Least Threatened	Not listed

Determining ecosystem status (Driver *et al.*, 2005). *BT = biodiversity target (the minimum conservation requirement).

Habitat remaining (%)		
80–100	least threatened	LT
60–80	vulnerable	VU
*BT–60	endangered	EN
0–*BT	critically endangered	CR

According to scientific literature (Driver *et al.*, 2005; Mucina *et al.*, 2006), as shown in **Table 6.2**, both vegetation types are listed as Least Threatened.

The National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), lists national vegetation types that are afforded protection on the basis of rates of transformation. The thresholds for listing in this legislation are higher than in the scientific literature, which means there are fewer ecosystems listed in the National Ecosystem List versus in scientific literature.

Neither vegetation types are listed in the National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011).

ii. Habitats on Site

Seven habitat types were identified within the grid connection corridor (refer to **Figure 6.12**), namely, hills and mountains, rock areas, plains, drainage areas, drainage scrub, open water, and no natural habitat. These are described in more details below.

Hills and mountains

The site is characterised by the presence of a range of hills that form a mini-escarpment parallel to the national road. The topography within these areas is relatively steep and rugged. There are also various low hills and the free-standing Bloukop inland of the mini-escarpment. The vegetation in these areas is a grassy dwarf karroid shrubland.

Rocky areas

There are various parts of the hills that contain outcrops of rocks, either as shelves or as boulders. The vegetation within these areas is largely woody, consisting of various low- to medium-height shrubs. The rocky areas constitute important refugia for small mammals and reptiles, including as potential habitat for the Near Threatened Karoo Dwarf Tortoise (*Homopus boulengeri*).

Plains

The plains on the lowlands have gently undulating topography. They are found between the hills throughout the site. The vegetation in these areas is mostly a dwarf karroid shrubland. These areas have been moderately to heavily grazed throughout the study area.

Drainage areas

In the lowest parts of the plains, often in wide bands, are areas that are shaped by fluvial processes and are either channelled in places or eroded from water movement. The soils are mostly deep sands where they have not been eroded away. The vegetation is a karroid dwarf shrubland or a sparse weedy community in eroded areas.

Drainage scrub

This forms part of the drainage areas, but has been mapped as a separate unit due to the clearly different vegetation structure and composition. The vegetation is a scrub or shrubland with shrubs up to 3 m high in places. The vegetation is relatively dense and the soils are deep and sandy. It constitutes an important refuge for wildlife, both in terms of the dense vegetation cover as well as the deep sands which are ideal for burrowing animals. Although considered unlikely that it would occur on site, this is the habitat that most closely matches the habitat requirements of the Critically Endangered Riverine Rabbit.

Open water

There are a number of farm dams on site. These are all man-made, but they nevertheless constitute an important water resource for wildlife. There is a possibility that the Protected Giant Bullfrog occurs in the general area, in which case these areas of open water may constitute important habitat for them.

No natural habitat

All areas where natural habitat has been lost have been included in this map unit. This includes farmhouses, roads, cultivated areas, previously cultivated areas, quarries and other disturbed areas.

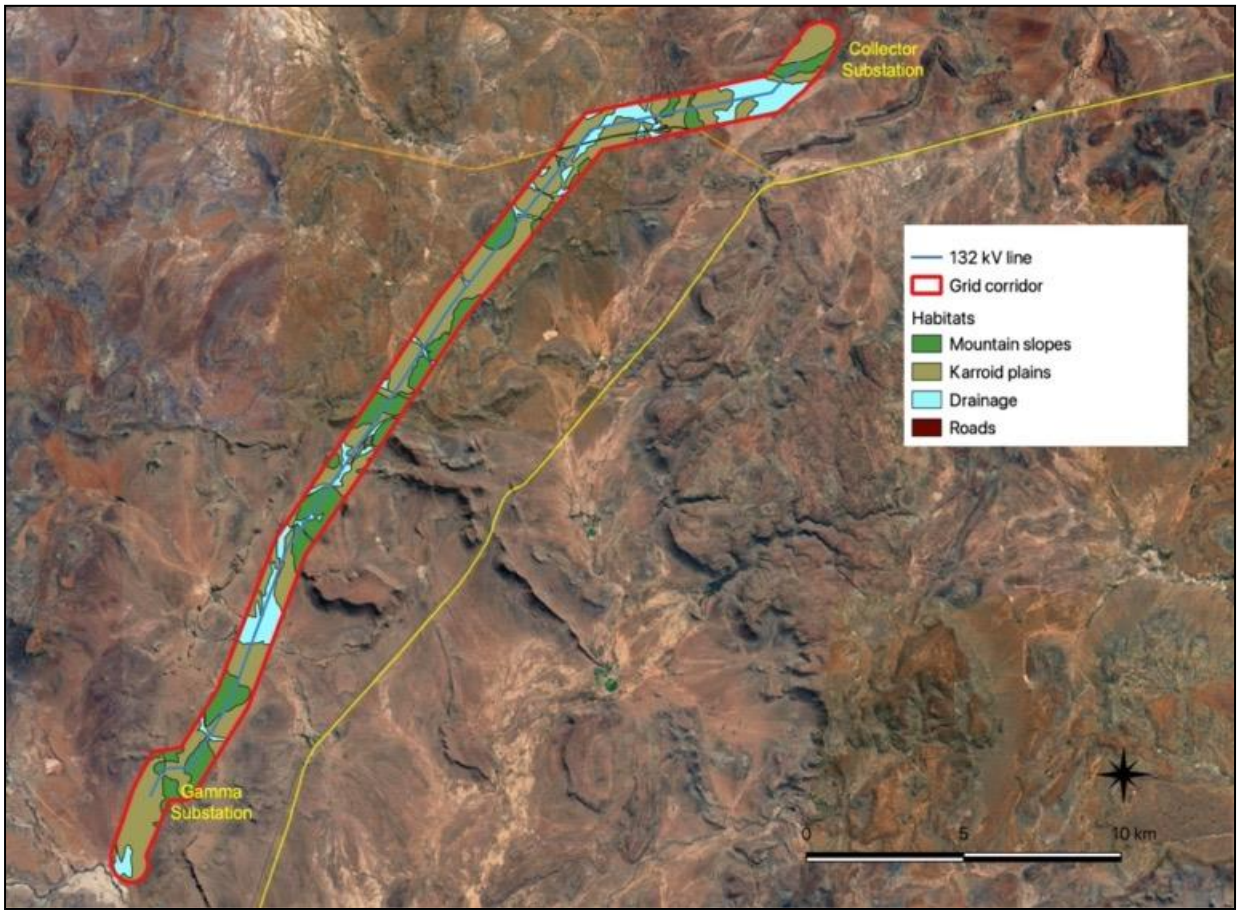


Figure 6.12: Habitats identified within the grid connection corridor

iii. Protected Areas and Proposed Protected Areas

According to an online database hosted by the DFFE (South African Protected, Conservation and Marine Protected Areas Data), there are no protected areas on site or in the near vicinity. The nearest protected area is more than 50km away.

According to the National Parks Area Expansion Strategy (NPAES), there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. The study area is therefore outside the NPAES focus area. There are many areas outside of the study site, to the north, south, east and west that are included as being part of future protected areas, but not within or adjacent to the site itself.

iv. Plant Species Flagged for the Study Area

According to the National Web-Based Environmental screening tool, 2 plant species have been flagged as of concern for the area the current project is in, these are listed below. A description of each species is provided.

Isolepis expallescens (Cyperaceae)
Vulnerable D2
This is a range-restricted habitat specialist known from only three locations, although its distribution range is botanically very poorly explored. It is found in the Nuweveld Mountains between Fraserburg and Victoria West in damp areas along stream channels. One of the known collections is near to Gamma substation – the given locality is the quarter degree grid 3123CB, which includes the entire southern half of the corridor. It could occur on site; in which case it would be found in channels with permanent moisture.

Hereroa concava (Aizoaceae)
Vulnerable B1ab(iii)
Due to taxonomic uncertainty, this species' distribution range is not well known. It appears to be endemic to a small area in the Great Karoo between Beaufort West, Richmond and De Aar. It is known to occur in Eastern Upper Karoo and Upper Karoo Hardeveld vegetation types. Plants occur sheltered among shrubs on flats and plateaus with shale outcrops. There are very few records of this species, and these known records are scattered over a wide area. Herbarium collections, where the identity is confirmed, indicate that it is common in the Karoo National Park. Its abundance elsewhere is not well known. Known records from iNaturalist include the plains above the mountains north of Beaufort West, and a hilltop north of Hanover. The study site is almost exactly halfway between these two locations and habitat on site fits the description of locations where this species has been previously recorded. There are two records of *Hereroa* species on site that have only been identified to genus level. Based on the distribution of known taxa, it is highly likely that they are *Hereroa concava*. It is therefore assumed that it probably occurs on site, and that rocky hills are the most likely habitat on site.

Sensitive species 945
A Near Threatened geophyte known from the summits of rocky dolerite ridges in the Nama Karoo. It is endemic to the karoo, occurring in the Sneeuberg, Agter-Sneeuberg and Nuweveld Mountains, extending inland to the area between Hanover and Beaufort West, broadly following the N1 road. There is a known photographic observation within the broad renewable energy cluster assessed for this overall project, which is near to the current Merino Wind Farm project. It is likely, based on the habitat requirements and distribution, that the species occurs on site, and that rocky hills are the most likely habitat on site.

Additional listed plant species for the study area

A database search identifies a number of additional listed plant species that could possibly occur on site that are not flagged in the Screening Tool output. This includes the following:

» *Tridentia virescens* (APOCYNACEAE) (Rare): Warmbad in southern Namibia to Kakamas and Prieska in the Nortern Cape stretching east to Prince Albert and Aberdeen. Stony ground, or hard loam in floodplains. It has a very wide geographical distribution but is rarely found. A relatively recent (2017) observation was made in the Doornkloof Nature Reserve north of Colesberg and it was documented in 1957 from near Murraysburg in habitat similar to that found on site. There is therefore at least a moderate Probability that it occurs on site.
» *Anisodontea malvastroides* (Rare): This species is endemic to the mountains of the Great Karoo, where it occurs in the Nuweveld and Sneeuberg mountains between Beaufort West and Middelburg in arid grassland on summit plateaus and escarpments. It has also been recorded on an inselberg-like outcrop north of Richmond. It could possibly occur on site, in which case it is likely to be found on the summit of prominent hills.
» *Aloe broomii* var *tarkaensis* (Rare) is found from Tarkastad and Middelburg to Graaff-Reinet in low stony ridges associated with the escarpment. The distribution of var. *tarkaensis* is to the south-east of the current site. Two observations of *Aloe broomii* were made on site, but both are from var. *broomii* and not var. *tarkaensis*. *Aloe broomii* var *tarkaensis* is therefore unlikely to occur on site.

v. Plant Species Recorded in the Study Area

A total of 72 plant species were recorded during the field surveys (refer to Appendix 2 of the plant species compliance statement). If other observation data is taken into account from other ad hoc surveys in the area, then there are close to 200 plant species that are known to occur in the direct study area and nearly 470 that are known from the general area that includes the site. This is relatively diverse for an arid environment.

vi. Protected Plant Species Recorded in the Study Area

No plant species protected under the National Environmental Management: Biodiversity Act (No. 10 of 2004) were identified on site. However, there are a number of species recorded on site that are protected under the Northern Cape Nature Conservation Act No. 9 of 2009. It is a legal requirement to obtain a permit from the provincial authorities for the destruction of any of these species.

vii. Trees Protected in Terms of the National Forests Act

No tree species protected under the National Forests Act (No. 84 of 1998) were identified within the grid connection corridor.

viii. Critical Biodiversity Areas and Ecological Support Areas

The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas,

are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.

Figure 6.13 shows the project area superimposed on the Terrestrial CBA map. The project area overlaps with the following areas:

» Critical Biodiversity Areas: There is one drainage line protruding into the corridor from the north that is within a CBA1 area. The Gamma substation and surrounding areas is within a CBA2 area.
» Ecological Support Areas: One other drainage line that crosses the corridor is within an ECA.
» Other Natural Areas: Most remaining areas on site are indicated as being in a natural state (Other Natural Area).

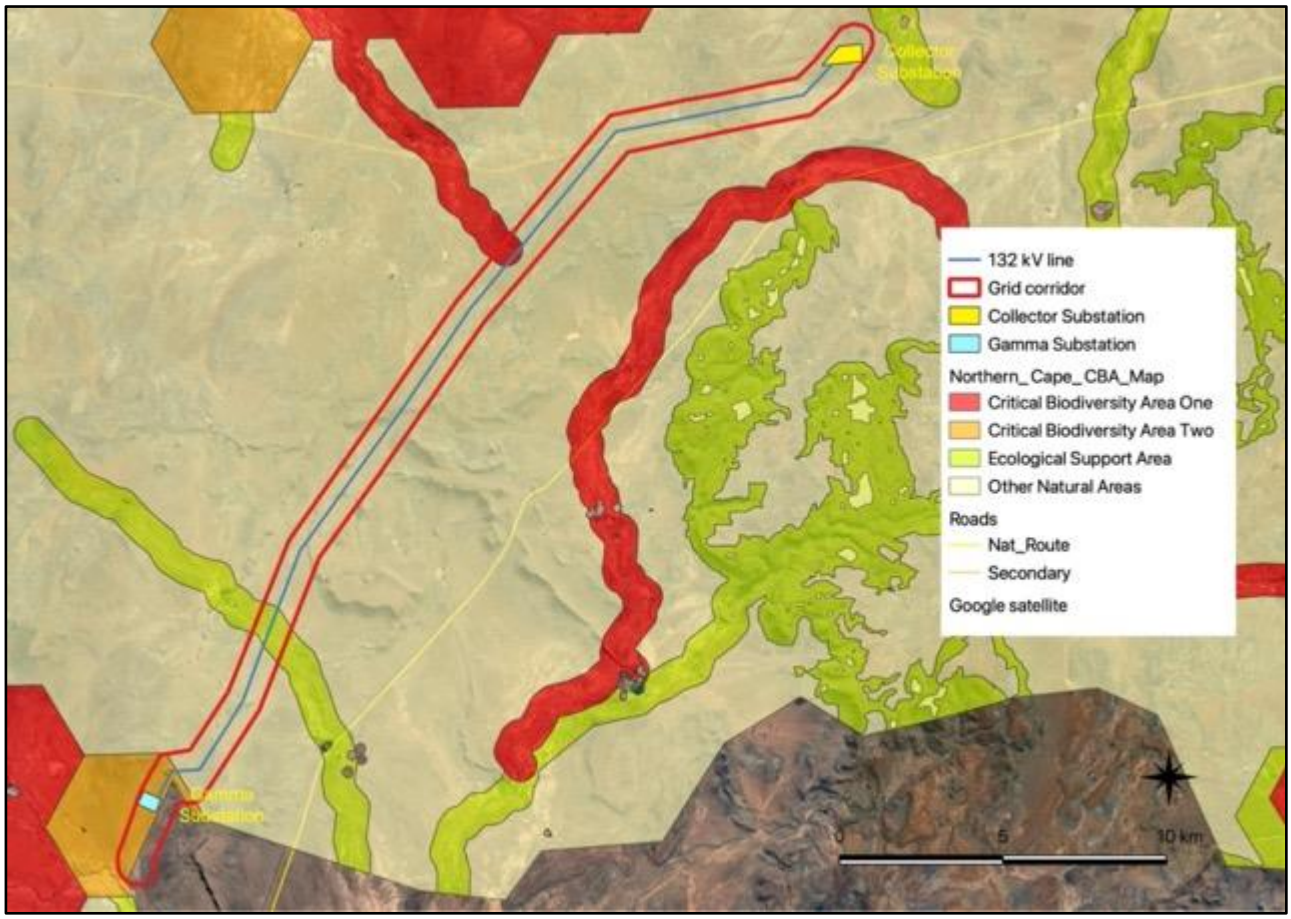


Figure 6.13: Map illustrating the locations of CBAs in the project area

ix. Wetlands and Freshwater Resources

Delineated Systems

Based on a combination of desktop and in-field delineation, three (3) forms of a watercourses were identified and delineated within the corridor (refer to **Figure 6.14**). These include episodic rivers, drainage lines and dams. No natural wetland systems, or even cryptic wetlands were identified for the project area. Episodic rivers refer to systems formed from run-off channels in very dry regions. The rivers and drainage lines are both classified as a river hydrogeomorphic (HGM) type systems. The dams are regarded as artificial systems and typically formed / created in the preferential flow paths of the river HGM types. The drainage

lines are not characterised by riparian vegetation and grasses. These systems represent bare surfaces with evidence of surface run-off.

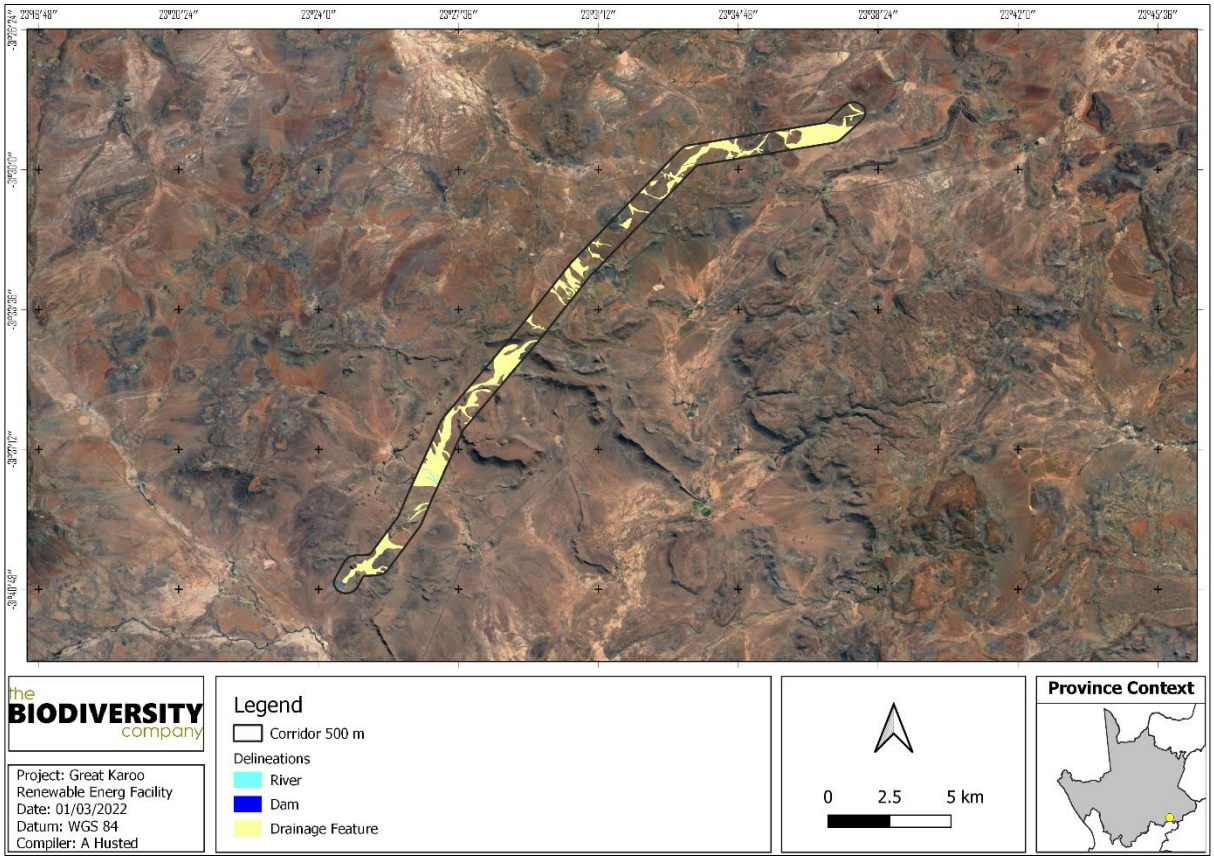


Figure 6.14: The delineated systems in relation to the project area

Inland Rivers

The National Biodiversity Assessment (NBA) (2018) spatial rivers dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released with the NBA 2018. In the NBA 2018, the National Freshwater Ecosystem Priority Areas (NFEPA) rivers GIS layer was used to represent the diversity of rivers nationally. The extent of rivers associated with the project area, and the corresponding threat status and protection level are presented in **Figure 6.15**. River systems classified as Endangered will be traversed by the connection.

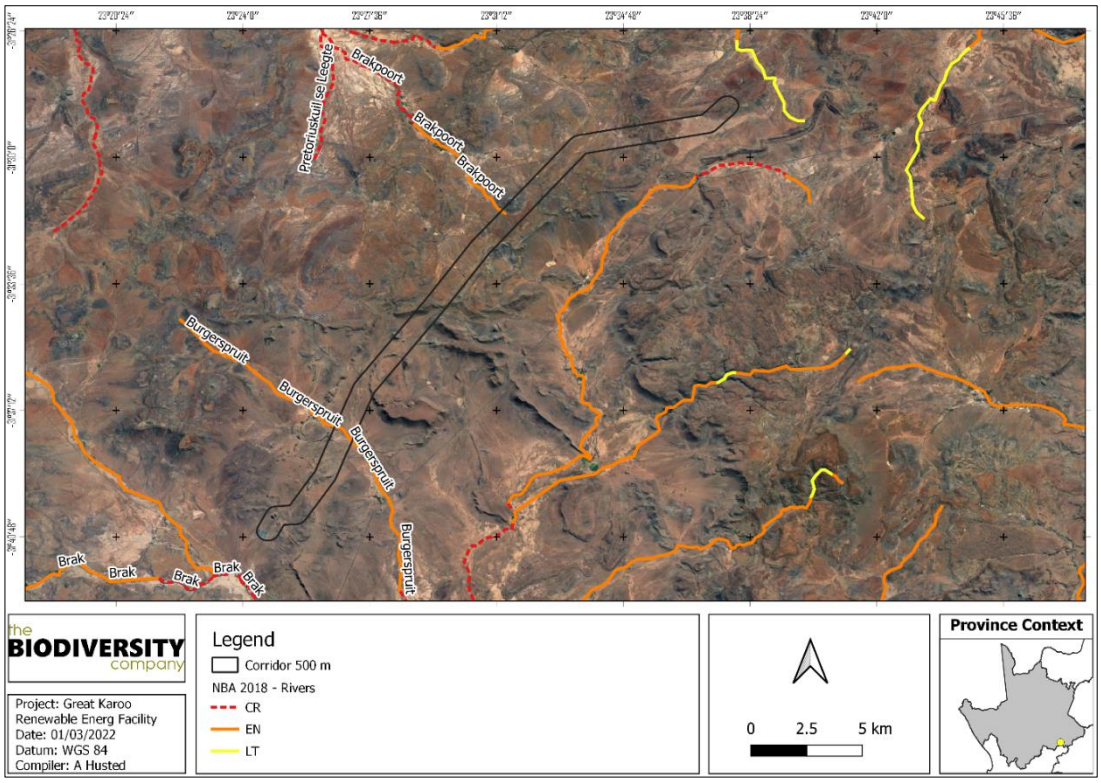


Figure 6.15: The NBA (2018) rivers in relation to the project area

x. Terrestrial Fauna Communities in the Study Area

Mammals

The semi-arid area south of Richmond is known for a low diversity of mammals firstly related to the lack of open water and secondly the long history of farming in the region. The impact of the sheep farming is that the migration corridors of larger mammals were restricted and over time, many species have been lost to the area. In recent years with the increase in hunting, some farmers have reintroduced some of the mammals that were previously present in the area. The obvious threat of predators to livestock further contributes to the low diversity of mammals occurring in the area. The smaller cats e.g., *Genetta genetta, Felis nigripes* (Vulnerable) and the less feared small fox, *Otocyon megalotis* were recorded recently in the QDS (FitzPatrick Institute of African Ornithology – Virtual Museum, Mammal Records, 2021 and i-Naturalist, 2021) (**Table 6.3**). There was some rodent activity (active burrows and tracks) observed, but the species were not identified during the survey.

The endangered *Bunolagus monticularis* is not expected in the area (known distribution range further south).

Table 6.3: Summary of expected mammals associated with the QDS 3123DA (shaded species represent either observation or signs of activity)

Family	*Genus and species name*	Common name	Conservation status
Bathyergidae	*Cryptomys hottentotus*	African Mole-rat	Least Concern
Bovidae	*Raphicerus campestris*	Steenbok	Least Concern
Bovidae	*Antidorcas marsupialis*	Springbok	Least Concern
Bovidae	*Pelea capreolus*	Grey Rhebok	Least Concern
Canidae	*Otocyon megalotis*	Bat-eared Fox	Least Concern
Cercopithecidae	*Papio ursinus*	Cape Baboon	Least Concern
Felidae	*Felis nigripes*	Black-footed Cat	Vulnerable

Family	*Genus and species name*	Common name	Conservation status
Herpestidae	*Suricata suricatta*	Meerkat	Least Concern
Herpestidae	*Herpestes pulverulentus*	Cape Grey Mongoose	Least Concern
Leporidae	*Lepus saxatilis*	Scrub Hare	Least Concern
Leporidae	*Lepus capensis*	Cape Hare	Least Concern
Muridae	*Rhabdomys pumilio*	Four-striped Grass Mouse	Least Concern
Mustelidae	*Ictonyx striatus*	Striped polecat	Least Concern
Orycteropodidae	*Orycteropus afer*	Aardvark	Least Concern
Pedetidae	*Pedetes capensis*	Springhare	Least Concern
Procaviidae	*Procavia capensis*	Rock hyrax	Least concern
Sciuridae	*Geosciurus inauris*	Cape Ground Squirrel	Least Concern
Viverridae	*Genetta genetta*	Small-spotted Genet	Least Concern

Amphibians

According to the records (FitzPatrick Institute of African Ornithology – Virtual Museum, Frog Records, 2021), only two (2) amphibian species (**Table 6.4**) were recently collected within the area (QD 3123DA). These are the Common Caco (*Cacosternum boettgeri*) and Tandy's Sand Frog (*Tomopterna tandyi*), both with a listed conservation status of "Least Concern". Due to the recent droughts, the probability of encountering any specimens within the project is low.

Table 6.4: List of Amphibians associated with the QDS (3123DA) of the study area

Family	*Genus and species name*	Common name	Conservation status
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	Least Concern
Pyxicephalidae	*Tomopterna tandyi*	Tandy's Sand Frog	Least Concern

Reptiles

One will expect a more extensive list of reptiles for the study, but the combined list for the QDS (FitzPatrick Institute of African Ornithology – Virtual Museum, Mammal Records, 2021 and i-Naturalist, 2021) gives a short list of recently confirmed specimens (**Table 6.5**). This can be a result of the recent extensive drought and modified landscape (grazing and vegetation modification) associated with the agricultural activities. There are no species listed as red data for the area.

Table 6.5: List of expected reptiles on the area of the proposed development (FitzPatrick Institute of African Ornithology – Virtual Museum, Reptile Records, 2021 and i-Naturalist, 2021)

Family	*Genus and species name*	Common name	Conservation status
Agamidae	*Agama atra*	Southern Rock Agama	Least Concern
Agamidae	*Agama aculeata*	Ground Agama	Least Concern
Colubridae	*Lamprophis aurora*	Aurora House Snake	Least Concern
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	Least Concern
Cordylidae	*Cordylus cordylus*	Cape Girdled Lizard	Least Concern
Gekkonidae	*Afroedura karroica*	Karoo Flat Gecko	Least Concern
Lacertidae	*Meroles suborbitalis*	Spotted Sand Lizard	Least Concern
Lacertidae	*Pedioplanis namaquensis*	Namaqua Sand Lizard	Least Concern
Scincidae	*Trachylepis sulcata*	Western Rock Skink	Least Concern
Scincidae	*Plestiodon gilberti*	Gilbert's Skink	Least Concern
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern
Varanidae	*Varanus albigularis*	Rock Monitor	Least Concern

Arachnida

A number of scorpions (**Table 6.6**) are listed for the larger area around the study site (African Snake Bite Institute, 2021) and a number of active burrows of these animals were noted during the survey.

Table 6.6: List of possible Scorpions that can occur on the study site, as these are listed in the larger area surrounding Richmond)

Family	*Genus and species name*	Common name	Conservation status
Buthidae	*Parabuthus granulatus*	Rough Thicktail Scorpion	Least Concern
Buthidae	*Parabuthus mossambicensis*	Mozambique Thicktail Scorpion	Least Concern
Buthidae	*Uroplectes carinatus*	Common Lesser-Thicktail Scorpion	Least Concern
Buthidae	*Uroplectes triangulifer*	Highveld Lesser-Thicktail Scorpion	Least Concern
Scorpionidae	*Opistophthalmus carinatus*	Radiant Burrower	Least Concern
Scorpionidae	*Opistophthalmus karrooensis*	Karroo Burrower	Least Concern

From the surveys conducted, it is clear that the animal diversity is low, and it can be linked to the current drought conditions and the semi-arid conditions associated with the region, as well as the history of habitat management associated with livestock production.

xi. Avifauna

Important Bird Areas (IBA)

There are no Important Bird Areas (IBA) within a 50km radius of the proposed Great Karoo EGI. The closest IBA to the project site is the Platberg-Karoo Conservancy IBA SA037, located approximately 65km north-east of the 132kV central collector substation. It is therefore highly unlikely that the proposed Great Karoo EGI development will have a negative impact on any IBA due to the distance from the project site

Avifauna Micro-habitats

The project site is located within the Nama Karoo biome. It consists of a flat plain with a number of inselbergs containing steep, boulder-strewn slopes, exposed rocky ridges and low cliffs. Two vegetation types are found in the development site, the dominant one being Eastern Upper Karoo, which is found on the plains and Upper Karoo Hardeveld occurring on the ridges.

Whilst the distribution and abundance of the bird species in the development area are typical of the broad vegetation type, it is also necessary to examine bird habitats in more detail as they may influence the distribution and behaviour of priority species. These are discussed in more detail below.

Nama Karoo: The vegetation at the study area consists of Karoo shrub vegetation, punctuated by rugged relief. Although not remarkably rich in species or endemism, the flora and fauna of the region are remarkably adapted to the region's climatic extremes. The major threats to biodiversity are posed by pastoralism, exotic plants, mining and agriculture. Trees and taller woody shrubs are restricted mostly to watercourses and include *Acacia karroo, Diospyros lycioides, Grewia robusta, Rhus lancea,* and *Tamarix usneoides.*

Surface water: The study area contains sources of both permanent (i.e. boreholes with water troughs) and ephemeral (i.e. dams) surface waterbodies. When filled with water, the dams typically attract flocks of Blue Crane *Anthropoides paradiseus* and Greater Flamingo *Phoenicopterus roseus* that utilise this habitat type in which to roost, as observed during the seasonal pre-construction monitoring surveys.

Rocky ridges: The study area contains a number of inselbergs with steep, boulder-strewn slopes, exposed rocky ridges and low cliffs. The rocky ridges that occur outside the study area support at least 11 Verreaux's Eagle nests, identified during the pre-construction monitoring programme, implemented at the at the proposed Great Karoo Cluster of Renewable Energy Facilities. Given the availability of similar rocky habitat within the Great Karoo EGI study area, it is possible that additional Verreaux's Eagle nests could occur both within the southern portion of the study area as well as the broader surrounds.

Agricultural lands: Cultivation in the broader area is limited to a few irrigated lands near the N1 national road where lucerne is cultivated. Arable or cultivated land represents a significant feeding area for many bird species in any landscape, but perhaps more so in arid environments. The opening up of the soil surface, and land preparation makes many insects, seeds, bulbs and other food sources suddenly accessible to birds and other predators; the crop or pasture plants cultivated are often eaten by birds, or attract insects which are in turn eaten by birds. Relevant to this development the commercial agricultural lands are located outside of the study area and the subsistence agriculture present at homesteads within the study area are unlikely to significantly increase the collision risk associated with the 132kV power line grid connection.

Alien trees: The study area is largely devoid of trees, except for alien trees which have been planted in homestead areas. Although stands of *Eucalyptus* are strictly speaking invader species, they have become important refuges for certain species of raptors, particularly Amur Falcon *Falco amurensis*, a Palearctic migrant, which will commonly roost in small stands of *Eucalyptus* in suburbs of small towns. Relevant to this project Amur Falcon, Lanner Falcon *Falco biarmicus*, Lesser Kestrel *Falco naumanni*, Greater Kestrel *Falco rupicoloides*, Tawny Eagle and Martial Eagle may utilise this habitat type occasionally.

High voltage lines: Five existing high voltage Transmission (TX) power lines occur within the study area, four of which run parallel to the proposed Great Karoo EGI 132kV power line grid connection, the closest being ~100m from the proposed alignment. Transmission lines are an important breeding substrate for raptors in the Karoo, due to the lack of large trees (Jenkins et al. 2013). The pre-construction monitoring programme, implemented at the proposed Great Karoo Cluster of Renewable Energy Facilities revealed two Tawny Eagle nests (31°33'52.23"S 23°29'57.56"E and 31°30'26.86"S 23°33'3.47"E) on the existing Droërivier – Hydra 2 400kV TX power line. In addition, two Martial Eagle nests were also recorded (31°34'33.67"S 23°29'24.05"E and 31°31'28.38"S 23°32'3.41"E) on the Droërivier-Hydra 1 400kV and Droërivier-Hydra 2 400kV transmission lines respectively. There may be additional nests present further south closer to the Gamma substation.

Bird Community within the Surrounding Area and the Project Site

The SABAP2 data indicates that a total of 167 bird species could potentially occur within the study area and immediate surroundings (Appendix 1 of the avifauna report provides a comprehensive list of all the species). Of these, 49 species are classified as priority species and 12 of these are South African Red List species. Of the priority species, 35 are likely to occur regularly at the study area and immediate surrounding area, and another 14 could occur sporadically. **Table 6.7** below lists all the priority species and the possible impact on the respective species by the proposed Great Karoo EGI project.

Results of the On-Site Surveys

An integrated pre-construction monitoring programme was implemented at the proposed Great Karoo Cluster of Renewable Energy Facilities (i.e., Kwana, Moriri and Nku Solar Energy Facilities (SEF) and Angora and Merino Wind Energy Facilities (WEF)) between October 2020 and November 2021. The programme

comprised of six seasonal surveys of both the proposed study areas and an identified control site within the broader study area. In order to describe the avifaunal community present, a concerted effort was made to sample the avifauna in all of the primary habitats that were available by applying walked and driven transects, vantage point, focal point and incidental survey techniques (Appendix 3 of the Avifauna Report).

The surveys produced a combined list of 113 species (Appendix 3 of the Avifauna Report) covering both the Great Karoo Cluster of Renewable Energy Facilities study area and to a limited extent, the surrounding area. Blue Crane (n=296), Karoo Korhaan *Eupodotis vigorsii* (n=51), Northern Black Korhaan *Afrotis afraoides* (n=49) and Southern Pale-chanting Goshawk *Melierax canorus* (n=24) were recorded in the largest abundances. Other notable observations included, Eleven (11) Verreaux's Eagle, four (4) Tawny Eagle and two (2) Martial Eagle nest locations. Relevant to this assessment, the two (2) Martial Eagle and two (2) Tawny Eagle nests present on the existing TX infrastructure (refer to **Figure 6.16**), that are aligned parallel to the proposed 132kV double circuit power line, are of particular importance. Although part of the southern portion of the 132kV power line corridor could not be surveyed due to time constraints, the identified microhabitats and existing power line infrastructure occur throughout the Great Karoo EGI study area and are likely to support an identical suite of priority species. All other observations were of small passerine, waterbird and wader species.

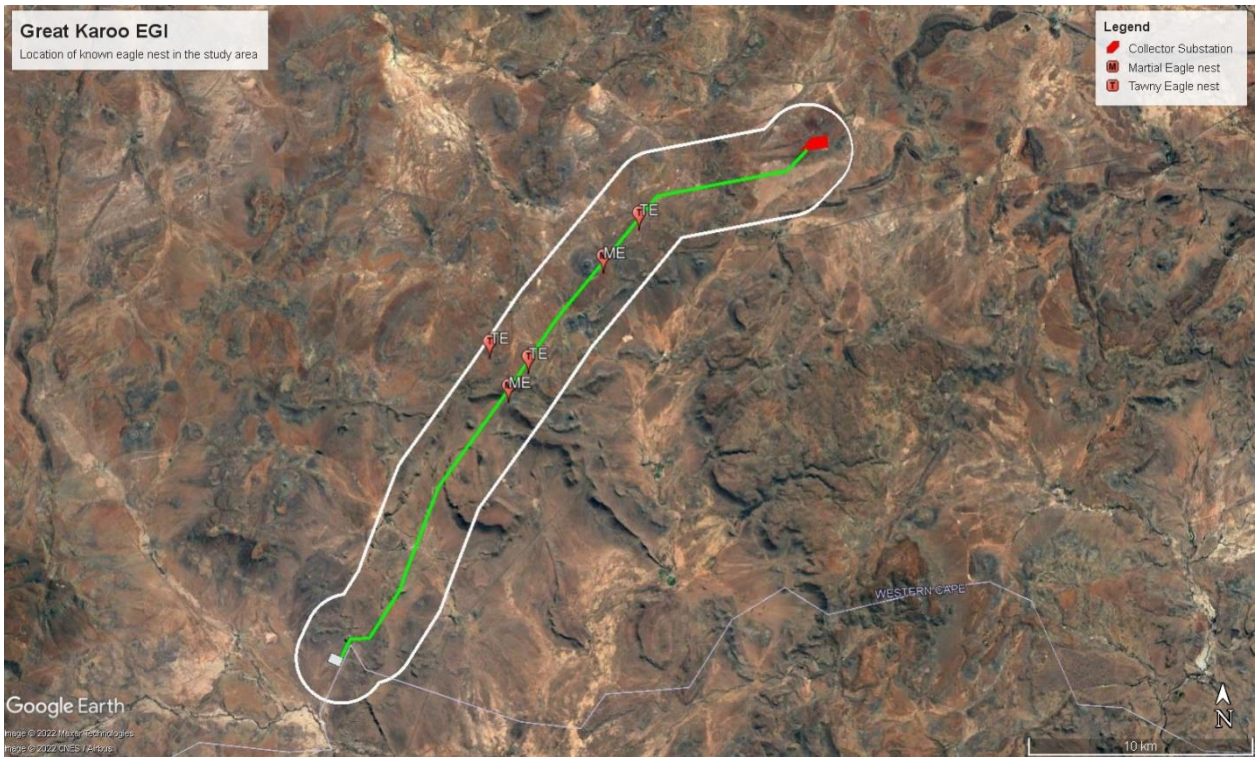


Figure 6.16: Known priority species nest locations within the study area

Table 6.7: Priority power line species potentially occurring within the study area and immediate surroundings (where **NT = Near threatened, VU = Vulnerable** and **EN = Endangered**

Species name	Scientific name	Full Protocol	Adhoc Protocol	Red List Global	Red List Regional	Power line priority	Recorded during surveys	Likelihood of occurrence	Nama Karoo	Surface water	Agriculture	Ridges	Alien trees	HV lines (roosting / breeding)	Substation - Electrocution	Power line - Electrocution	Power line - Collision	Displacement (disturbance)	Displacement (habitat transformation)
African Fish Eagle	*Haliaeetus vocifer*	1,5152	0	-	-	x	x	L		x			x						
African Harrier-Hawk	*Polyboroides typus*	4,5455	1,2903	-	-	x	x	M	x			x	x		x			x	x
African Sacred Ibis	*Threskiornis aethiopicus*	9,0909	5,8065	-	-	x	x	M		x	x				x		x	x	
African Spoonbill	*Platalea alba*	4,5455	3,2258	-	-	x		L		x							x		
Black Harrier	*Circus maurus*	1,5152	0	EN	EN	x		L	x		x				x				x
Black Stork	*Ciconia nigra*	3,0303	0,6452	-	VU	x	x	M		x		x			x		x	x	
Black-headed Heron	*Ardea melanocephala*	9,0909	0,6452	-	-	x		L	x	x					x		x		x
Black-winged Kite	*Elanus caeruleus*	1,5152	0	-	-	x		L	x		x		x	x	x			x	x
Blue Crane	*Grus paradisea*	62,1212	15,4839	VU	NT	x	x	H	x	x	x						x	x	x
Booted Eagle	*Hieraaetus pennatus*	4,5455	0	-	-	x	x	M	x	x		x		x	x				
Cape Crow	*Corvus capensis*	10,6061	5,1613	-	-	x	x	M	x		x		x	x	x			x	x
Cape Shoveler	*Spatula smithii*	1,5152	0,6452	-	-	x		L		x							x		
Cape Teal	*Anas capensis*	3,0303	1,2903	-	-	x		L		x							x		
Cape Vulture	*Gyps coprotheres*	0	0	VU	EN	x	x	L	x			x		x	x	x	x		
Common Buzzard	*Buteo buteo*	1,5152	3,871	-	-	x	x	M	x		x		x	x	x				
Common Moorhen	*Gallinula chloropus*	1,5152	0	-	-	x		L		x									
Egyptian Goose	*Alopochen aegyptiaca*	30,303	5,1613	-	-	x	x	H		x	x				x		x	x	x
Greater Flamingo	*Phoenicopterus roseus*	3,0303	0,6452	-	NT	x	x	M		x							x	x	
Greater Kestrel	*Falco rupicoloides*	27,2727	4,5161	-	-	x	x	H	x				x	x	x			x	x
Grey Heron	*Ardea cinerea*	6,0606	0,6452	-	-	x	x	M		x							x	x	
Hadada Ibis	*Bostrychia hagedash*	27,2727	3,871	-	-	x	x	H	x		x		x	x	x		x	x	x
Hamerkop	*Scopus umbretta*	6,0606	0,6452	-	-	x		L		x							x		
Helmeted Guineafowl	*Numida meleagris*	9,0909	0,6452	-	-	x		M	x		x		x	x	x		x	x	x

Species name	Scientific name	Full Protocol	Adhoc Protocol	Red List Global	Red List Regional	Power line priority	Recorded during surveys	Likelihood of occurence	Nama Karoo	Surface water	Agriculture	Ridges	Alien trees	HV lines (roosting / breeding)	Substation - Electrocution	Power line - Electrocution	Power line - Collision	Displacement (disturbance)	Displacement (habitat transformation)
Jackal Buzzard	*Buteo rufofuscus*	36,3636	10,3226	-	-	x	x	H	x	x		x		x	x			x	x
Karoo Korhaan	*Eupodotis vigorsii*	51,5152	5,1613	-	NT	x	x	H	x								x	x	x
Lanner Falcon	*Falco biarmicus*	1,5152	1,2903	-	VU	x	x	M	x	x	x	x	x	x	x			x	x
Lesser Kestrel	*Falco naumanni*	3,0303	1,2903	-	-	x	x	M	x		x		x	x	x				
Little Grebe	*Tachybaptus ruficollis*	3,0303	0	-	-	x	x	L		x							x		
Ludwig's Bustard	*Neotis ludwigii*	37,8788	3,871	EN	EN	x	x	H	x		x						x	x	x
Martial Eagle	*Polemaetus bellicosus*	7,5758	1,9355	EN	EN	x	x	H	x	x			x	x	x			x	x
Northern Black Korhaan	*Afrotis afraoides*	68,1818	11,6129	-	-	x	x	H	x		x						x	x	x
Pale Chanting Goshawk	*Melierax canorus*	40,9091	12,9032	-	-	x	x	H	x	x			x	x	x			x	x
Pied Crow	*Corvus albus*	83,3333	38,7097	-	-	x	x	H	x		x	x	x	x	x			x	x
Red-billed Teal	*Anas erythrorhyncha*	10,6061	1,2903	-	-	x	x	M		x							x		
Red-knobbed Coot	*Fulica cristata*	4,5455	0	-	-	x		M		x							x		
Reed Cormorant	*Microcarbo africanus*	3,0303	0	-	-	x		M		x							x		
Rock Kestrel	*Falco rupicolus*	31,8182	1,9355	-	-	x	x	H	x			x	x	x	x			x	x
Secretarybird	*Sagittarius serpentarius*	9,0909	3,2258	EN	VU	x	x	M	x	x			x				x	x	x
South African Shelduck	*Tadorna cana*	39,3939	2,5806	-	-	x	x	M		x							x		
Spotted Eagle-Owl	*Bubo africanus*	6,0606	0	-	-	x		M	x			x	x		x		x	x	x
Spur-winged Goose	*Plectropterus gambensis*	6,0606	3,2258	-	-	x	x	M		x	x						x		
Tawny Eagle	*Aquila rapax*	10,6061	5,8065	VU	EN	x	x	H	x	x			x	x	x			x	x
Verreaux's Eagle	*Aquila verreauxii*	19,697	6,4516	-	VU	x	x	H	x	x		x	x	x	x		x	x	x
Western Barn Owl	*Tyto alba*	1,5152	0	-	-	x		L	x		x		x		x		x		x
Western Cattle Egret	*Bubulcus ibis*	1,5152	0	-	-	x		L	x		x		x		x		x	x	x
White Stork	*Ciconia ciconia*	0	1,2903	-	-	x		L	x	x	x						x		
White-breasted Cormorant	*Phalacrocorax lucidus*	3,0303	0	-	-	x	x	M		x							x		

Species name	Scientific name	Full Protocol	Adhoc Protocol	Red List Global	Red List Regional	Power line priority	Recorded during surveys	Likelihood of occurrence	Nama Karoo	Surface water	Agriculture	Ridges	Alien trees	HV lines (roosting / breeding)	Substation - Electrocution	Power line - Electrocution	Power line - Collision	Displacement (disturbance)	Displacement (habitat transformation)
White-necked Raven	*Corvus albicollis*	34,8485	7,0968	-	-	x	x	H	x			x	x	x	x			x	x
Yellow-billed Duck	*Anas undulata*	15,1515	1,9355	-	-	x	x	M		x							x		

6.5 Visual Quality

The study area occurs on land that ranges in elevation from approximately 1 170m above sea level (in the south-western corner of the study area) to 1 830m (at the top of the mountains to the east). The terrain along the proposed alignment is predominantly flat with some hills and ridges occurring predominantly to the south of the alignment. Two of the larger hills, or small mountains, are the Blouberg and the Platberg. Other mountains and hills in closer proximity to the alignments include Bobbejaankrans, Bulberg, Kamberg and Kromhoek se Berg.

The proposed alignment will traverse from 1 358m (the substation site) to 1 225m above sea level at the Gamma MTS. The overall terrain morphological description of the study area is described as *undulating plains* (lowlands), with *ridges*, *hills* and *mountains*. These hills and mountains are often referred to as *inselbergs* (island mountains) due to their isolated nature, or *mesas* (table mountains) due to their flat-topped summits.

The majority of the study area is sparsely populated (less than 1 person per km^2), with the highest concentration of people living in the town of Richmond. The study area consists of a landscape that can be described as remote due to its considerable distance from any major metropolitan centres or populated places. The scarcity of water and other natural resources has influenced settlement within this region, keeping numbers low, and distribution limited to the availability of water. Settlements, where they occur, are usually rural homesteads or farm dwellings.

View along the Hutchinson secondary road looking north-west towards the proposed substation site.

The general environment within the study area.

Existing power lines along the proposed alignment (looking to the north-east).

Typical Great Karoo scene as seen from the N1 national road.

Figure 6.17: Photographs showing the general environment within the area.

The potential visual exposure (visibility) of the grid connection infrastructure) is shown in **Figure 6.18**. It is expected that the grid connection infrastructure may theoretically be visible within the 3km visual corridor and potentially highly visible within a 0.5 – 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 four larger power lines immediately south-east of it, as well as the single power line north-west of it.

The following potential sensitive visual receptors were identified:

0 – 0.5km

The majority of the exposed areas in this zone fall within vacant open space, generally devoid of observers or potential sensitive visual receptors. The Hutchinson secondary road will traverse within 380m from the proposed substation site and underneath the proposed alignment. There are no homesteads within a 0.5km radius of the proposed infrastructure.

0.5 – 1.5km

This zone contains sections of the Hutchinson secondary road. Other than this receptor site, the rest of the visually exposed areas fall within vacant farmland and open space. There are no homesteads within this zone.

1.5 – 3km

There are three potentially exposed receptor sites within this zone, namely observers residing at the Kleinfontein, Burgersfontein and Poortjie homesteads. Additional visual exposure may occur along a section of the R63 arterial road traversing south-west of the Gamma Substation. The power line infrastructure may briefly be visible (in transit) from the N1 national road near the Kleinfontein homestead. It should however be borne in mind that the four larger existing power lines south of the proposed 132kV power line would likely obstruct clear views of the power line.

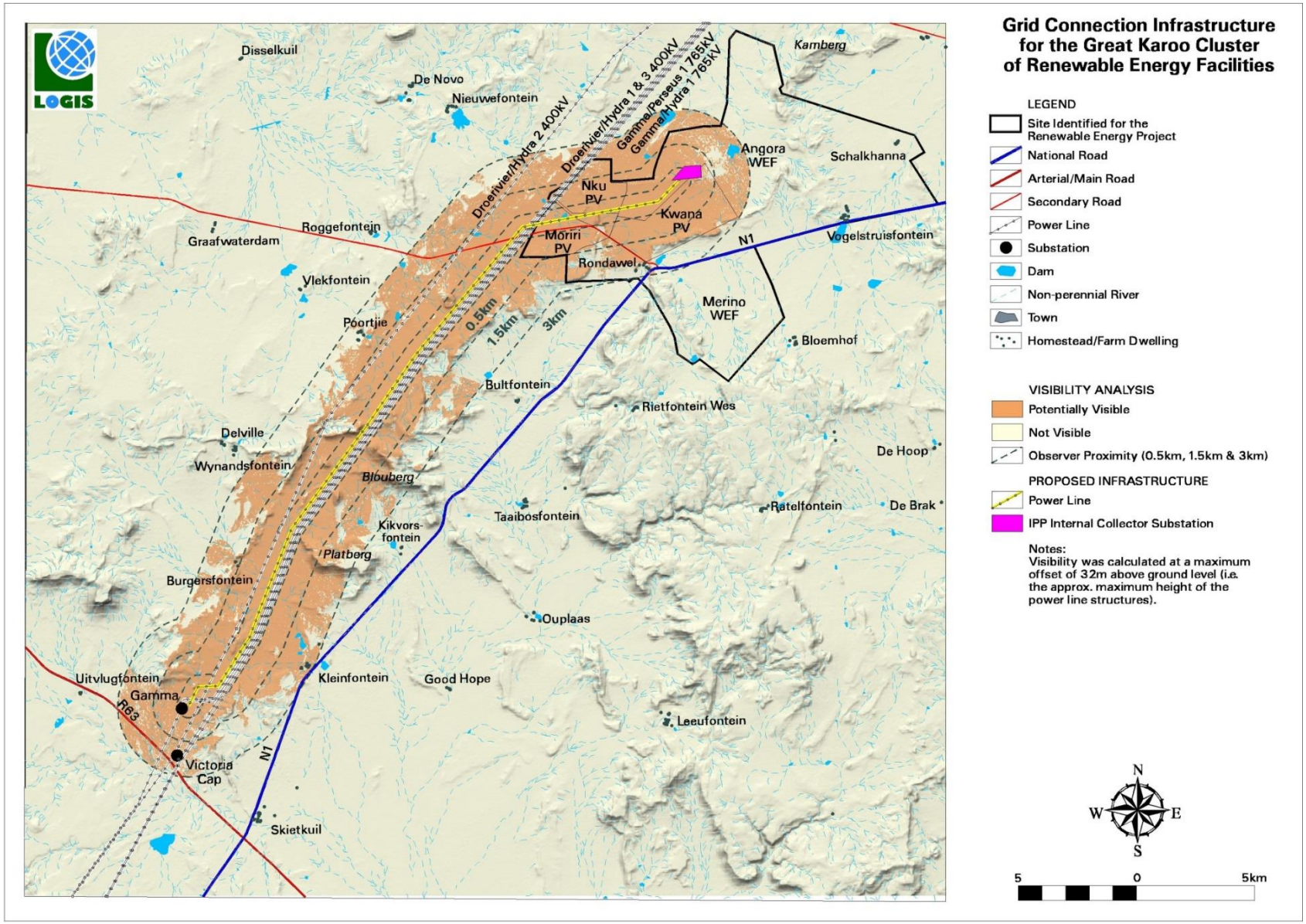


Figure 6.18: Viewshed analysis of the proposed grid connection infrastructure.

6.6 Heritage Profile

6.6.1 Archaeology

Thirty (30) archaeological and heritage resources were identified during the survey of the grid connection corridor and substation footprint. All of the identified heritage resources are not considered to be conservation worthy. **Table 6.8** lists the archaeological heritage finds and **Figure 6.19** provides a locality map of the archaeological and heritage resources identified within the grid connection corridor and substation footprint.

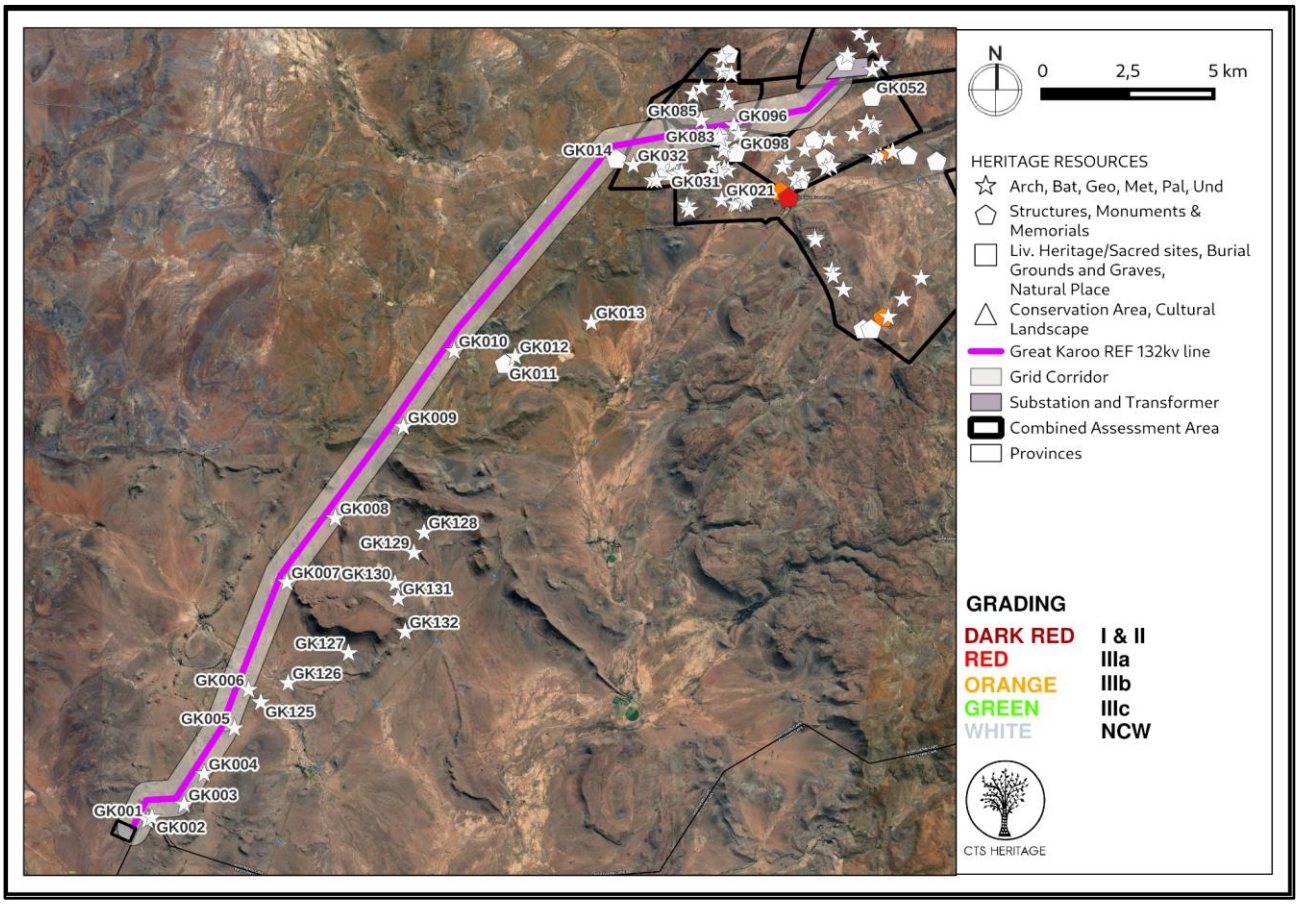


Figure 6.19: Map of archaeological observations in proximity to the proposed development area

Table 6.8: Observations made during the archaeological field assessment

POINT ID	Site Name	Description	Period	Co-ordinates		Grading	Mitigation
GK001	Great Karoo 001	Hornfels broken up source rock, one flake	MSA	-31,67536	23,41625	NCW	NA
GK002	Great Karoo 002	Siltstone flakes and cores near dolerite boulder shelter	MSA	-31,67466	23,41763	NCW	NA
GK003	Great Karoo 003	Quarrying of hornfels and greywacke, no formal tools seen	MSA	-31,67114	23,42757	NCW	NA
GK004	Great Karoo 004	Patinated hornfels assemblage,	MSA	-31,66289	23,43376	NCW	NA

		mainly blades near dry stream bed. Not early MSA					
GK005	Great Karoo 005	Early MSA flake, edge slightly worked	MSA	-31,65061	23,44315	NCW	NA
GK006	Great Karoo 006	Hornfels cores and flakes, one white very patinated flake with old retouched edges	MSA	-31,64028	23,44753	NCW	NA
GK007	Great Karoo 007	Hornfels flakes, cores, greywacke cores and flakes. Partially buried in Kalahari sands	MSA	-31,61139	23,45934	NCW	NA
GK008	Great Karoo 008	Fine grained hornfels flakes, microliths, LSA. Patinated and older MSA cores and flakes in natural clearing surrounded by dolerite boulders	LSA, MSA	-31,59409	23,47433	NCW	NA
GK009	Great Karoo 009	Hornfels flake, cortex remaining on dorsal	MSA	-31,56952	23,49539	NCW	NA
GK010	Great Karoo 010	Rusted large metal spanner, pole, rings associated with powerlines	Modern	-31,54909	23,51106	NCW	NA
GK011	Great Karoo 011	Windmill, concrete tank	Modern	-31,55271	23,5267	NCW	NA
GK012	Great Karoo 012	Hornfels blade flake	MSA	-31,55056	23,52993	NCW	NA
GK013	Great Karoo 013	Patinated hornfels flakes and siltstone	MSA	-31,54143	23,55346	NCW	NA
GK014	Great Karoo 014	Brick plastered tank	Modern	-31,49752	23,56122	NCW	NA
GK021	Great Karoo 021	Hornfels flake buried in donga exposure	MSA	-31,50839	23,59374	NCW	NA
GK031	Great Karoo 031	Windmill	Modern	-31,50086	23,57677	NCW	NA
GK032	Great Karoo 032	Very thin, weathered hornfels flake	MSA	-31,49897	23,56639	NCW	NA
GK052	Great Karoo 052	Windmill	Modern	-31,480756	23,640181	NCW	NA
GK083	Great Karoo 083	Windmill	Modern	-31,49136	23,59298	NCW	NA
GK085	Great Karoo 085	Hornfels core and flakes	LSA	-31,48695	23,58745	NCW	NA
GK096	Great Karoo 096	Hornfels flake blade	MSA	-31,48828	23,5975	NCW	NA
GK098	Great Karoo 098	Windmill	Modern	-31,49582	23,59807	NCW	NA
GK125	Great Karoo 125	greywacke and hornfels cores and flakes	MSA	-31,643632	23,451292	NCW	NA

GK126	Great Karoo 126	Hornfels flakes, dorsal reduction	MSA	-31,6384659	23,45974918	NCW	NA
GK127	Great Karoo 127	Quartzite flake	MSA	-31,63040907	23,47842969	NCW	NA
GK128	Great Karoo 128	Hornfels bladelet	LSA	-31,5979548	23,50175682	NCW	NA
GK129	Great Karoo 129	greywacke core	MSA	-31,60338828	23,49861806	NCW	NA
GK130	Great Karoo 130	Hornfels blade flake	MSA	-31,61165517	23,49280684	NCW	NA
GK131	Great Karoo 131	Hornfels bladelet	LSA	-31,61571999	23,49376	NCW	NA
GK132	Great Karoo 132	Hornfels flake	MSA	-31,62469267	23,49593221	NCW	NA

6.6.2 Palaeontology

According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments of very high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3122 for Victoria West, the development area is underlain by the Abrahamskraal and Teekloof Formations, both of the Adelaide Subgroup of the Beaufort Group of sediments. The Beaufort Group sediments are known to preserve diverse terrestrial and freshwater tetrapods of *Tapinocephalus* to *Lystrosaurus* Biozones (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways) and sparse vascular plants (*Glossopteris* Flora, including petrified wood).

Six (6) palaeontological heritage resources were identified during the survey of the grid connection corridor and substation footprint. **Table 6.9** provides a description of the palaeontological finds and **Figure 6.20** provides a locality map of the palaeontological heritage resources identified along the corridor.

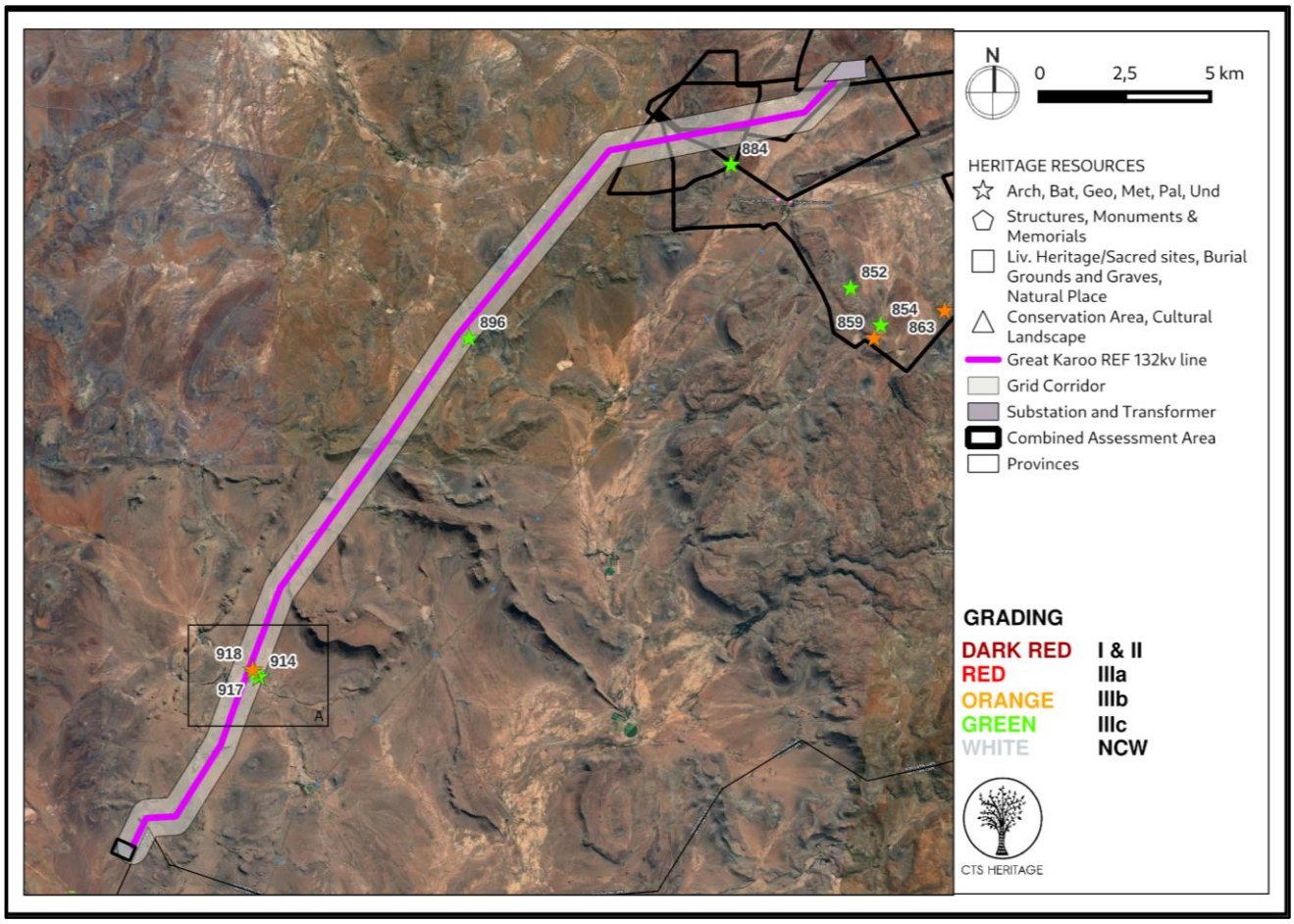


Figure 6.20: Map of palaeontological heritage resources in proximity to the proposed development area

Table 6.9: Palaeontological observations made during the field assessment for the proposed Grid Connection Infrastructure

POINT ID	Description	Co-ordinates		Grading	Mitigation
884	Rondavel 85. Hoedemaker Member. Thin crevasse splay sandstone exposed in shallow borrow pit with sandstone-infilled mudcracks, microbial mat textures, small-scale invertebrate trace fossils (narrow horizontal burrows of undermat miners), possible vertical burrows or plant stem casts. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-31.49779201	23.59721803	IIIC	NA
896	Farm 96. "Balfour Formation" (Oukloof Member of Teekloof Fm). Scatter of baked white bone fragments of small-bodied tetrapod within quartzite surface gravels, in part preserved as moulds. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-31.54356097	23.51600602	IIIC	NA
914	Burgersfontein 92. Probable Poortjie Member, baked heterolithic package in bed of Burgerspruit. Fragment of skull (probably palate) of small tetrapod embedded within baked, grey-green wacke. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-31.63286403	23.450985	IIIC	NA
915	Burgersfontein 92. Probable Poortjie Member, bed of Burgerspruit. Postcranial bone of small tetrapod embedded within baked, grey-green wacke. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-31.63276596	23.450855	IIIC	NA

917	Burgersfontein 92. Late Caenozoic sandy to gravelly alluvium overlying calcrete-veined weathered dolerite exposed in banks of Burgerspruit. Assemblage of subvertical, subcylindrical calcretised structures – probably rhizoliths. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	-31.63184898	23.44953099	IIIC	NA
918	Burgersfontein 92. Probable Poortjie Member. Crushed, baked probable small tetrapod skull within thin-bedded grey-green siltstone with possible baked gypsum roses exposed on bed of Burgerspruit. Proposed Field Rating IIIB. Site protected in river bed within standard ecological riverine buffer.	-31.63092203	23.44897603	IIIB	20m no-go buffer

6.6.2 Cultural Landscape

The landscape of the development area has been assessed for cultural heritage significance, and found to have five distinct character areas:

- Historic movement corridors.
- Open plains interrupted by low koppies.
- Elevated areas with steep sided mountain ridges.
- Areas of landscape that have been transformed by significant infrastructural development.
- Remote landscape with wilderness qualities.

Of the five distinct character areas identified in the Cultural Landscape Assessment (Winter, 2021), the proposed grid connection infrastructure falls within one character area, namely, 'areas of landscape that have been transformed by significant infrastructural development' (refer to **Figure 6.21**). **Table 6.10** provides a description of the cultural landscape character area associated with the grid connection infrastructure.

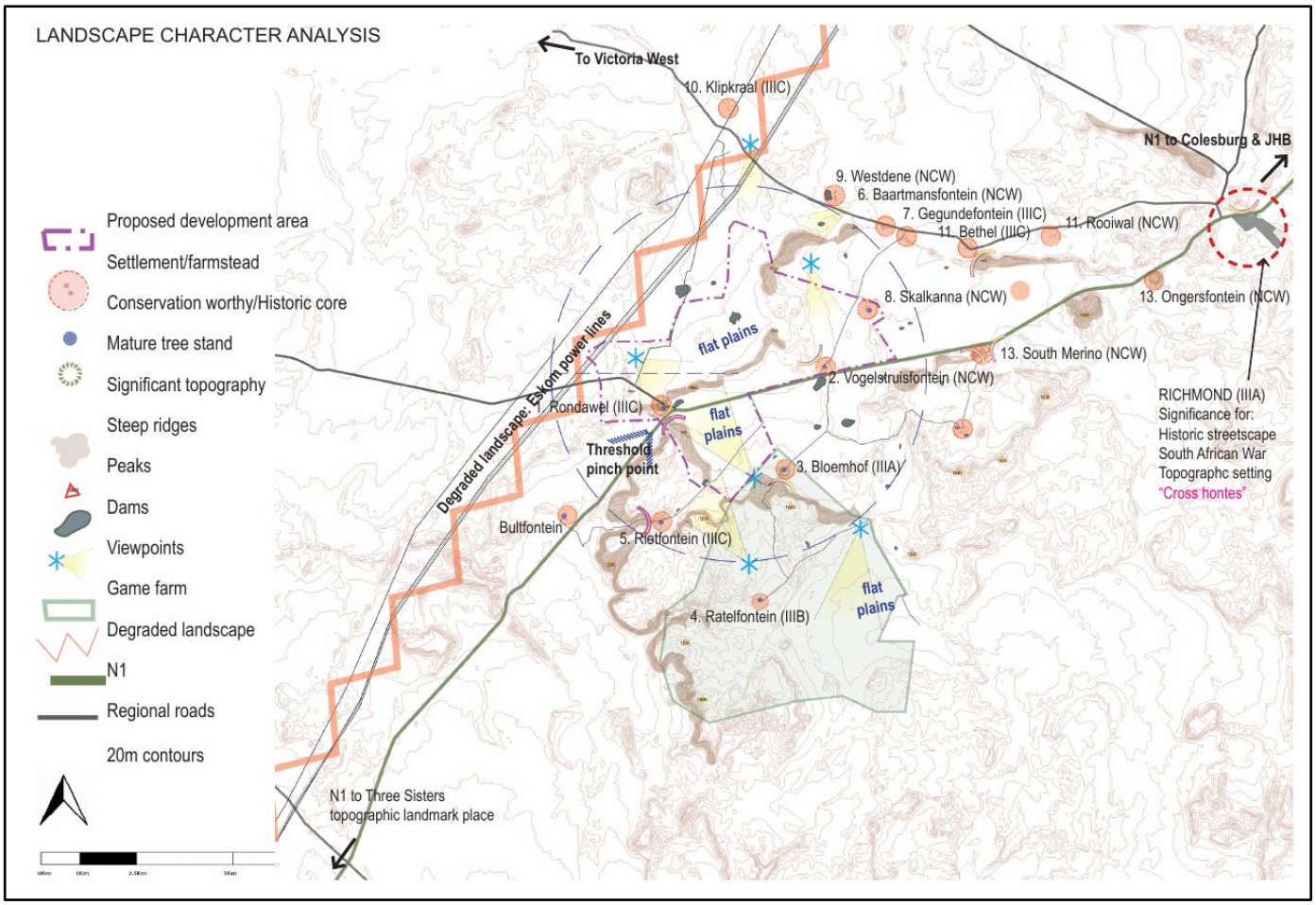


Figure 6.21: Map of cultural landscape heritage resources in proximity to the proposed development area

Table 6.10: Cultural Landscape Character Area 4

Significance	Character	Carrying Capacity
4. Transformed landscape Electricity grid parallel to and set back from (4 km) the N1 corridor south of site.	Introduction of industrial activities and intrusion of large-scale infrastructure in agricultural areas. Visual cluttering of the landscape by non-agricultural development.	Infrastructure can be concentrated in this area.

6.7 Social Profile

6.7.1. Profile of the Broader Area

The project site is located within Ward 3 of the Ubuntu Local Municipality, which forms part of the Pixley Ka Seme District Municipality and a portion (approximately 2km) of the grid corridor falls within Ward 1 of the Beaufort West Local Municipality of the Central Karoo District.

Population

According to the Community Household Survey conducted in 2016, the Ubuntu Local Municipality has a population of 19 471. Of this total, 38.6% are under the age of 18, 55.9% between 18 and 64, and the

remaining 5.5% are 65 and older. According to the 2011 StatsSA data, the population of Ward 3 is 4 715. Of this total 37% under the age of 18, 58% between 18 and 64, and the remaining 5% are 65 and older. The Ubuntu Local Municipality and the Ward 3 therefore have a high percentage of the population that falls within the economically active group of 18 – 65.

The population of the Beaufort West Local Municipality in 2016 was 51 080. Of this total, 36.4% were under the age of 18, 56.7% were between 18 and 64, and the remaining 7% were 65 and older. The Beaufort West Local Municipality has a relatively high percentage of people under the age of 18 and over the age of 65. This implies that a larger percentage of the population is dependent on the economically productive sector. In terms of race groups, Coloureds made up 75.1% of the population on the Beaufort West Local Municipality (2016), followed by Black Africans (17.7%) and Whites, 7%. The main first language spoken in the Beaufort West Local Municipality was Afrikaans (83%), followed by isXhosa (13.1%) and English (2.9%).

Employment

The official unemployment rate in the Ubuntu Local Municipality in 2011 was 18.1%, while 44.2% were employed, and 33.2% were regarded as not economically active. The figures for Ward 3 in 2011 were 6.8% unemployed, 62.5% employed and 28.4% not economically active. The unemployment rates for the Ubuntu Local Municipality and Ward 3 are lower than the Provincial rate of 14.5% and the District rate of 14.8%. Recent figures released by Stats South Africa also indicate that South Africa's unemployment rate is in the region of 36%, the highest formal unemployment rate in the world.

The official unemployment rate in the Beaufort West Local Municipality in 2016 was 12.2%, while 44.1% were regarded as not economically active and 8.3% were discouraged work seekers. The 2020 Socio-economic profile of the Beaufort West Local Municipality prepared by the Provincial Government notes that the Beaufort West Local Municipality (24.2%) had the highest unemployment area in the Central Karoo District Municipality (22%) in 2019. The rate was also higher than the provincial rate (19.4%). The report notes that the high unemployment rate is particularly concerning given that this estimate is based on the narrow definition of unemployment i.e., the percentage of people that are able to work, but unable to find employment. In turn, the broad definition generally refers to people that are able to work, but not actively seeking employment. The current unemployment rates are likely be higher due to impact of COVID-19 pandemic on the national, provincial, and local economy.

Education

In terms of education levels, the percentage of the population over 20 years of age in the Ubuntu Local Municipality and Ward 3 with no schooling was 11.8% (2016) and 20.7% (2011), respectively, compared to 7.9% and 11.1% for the Northern Cape Province in 2016 and 2011, respectively. The percentage of the population over the age of 20 with matric was 23.2% and 15.6%, respectively, compared to 29.1% (2016) and 25.2% (2011) for the Northern Cape. The lower education levels are linked to the rural, isolated nature of the area.

In terms of education levels, the percentage of the population over 20 years of age in the Beaufort West Local Municipality with no schooling was 5.5% (2016) and 6.8% (2011) respectively, compared to 2.4% for the Western Cape (2016). The percentage of the population over the age of 20 with matric was 32.3% and 28.3% respectively, compared to 35.2% for the Western Cape. The education levels in the Beaufort West Local

Municipality are therefore marginally lower than the provincial levels. This reflects the rural nature of the area and the highlights the vulnerability of the local communities in these areas.

6.7.2. Profile of the Immediate Affected Area

The Great Karoo Cluster of Renewable Energy Facilities is located to the north of the N1, between Three Sisters and Richmond. The closest towns to the site are Richmond, which is located approximately 35km south-west of the site, and Victoria West, which is located approximately 80km south-east the site. The bulk of the site is located to the north of the N1 with a small portion located to the south.

The town of Richmond was established in 1843 when a new congregation was formed for the area. The town was named after the Duke of Richmond from Kent, who was the father-in-law of the Governor of the Cape at that time, Sir Peregrine Maitland. Historically the town served as resort town for European aristocratic tuberculosis patients in the 1800s due to its clean air and mineral rich waters. The Pixley Ka Seme District Municipality Spatial Development Framework identifies Richmond as an Urban Satellite Town. These are towns that already have some services and infrastructure and have the potential to grow. The economy of the town is linked to providing services to the surrounding farming areas and through traffic associated with the N1.

The town of Victoria West was named after Queen Victoria of England and established in 1843. Victoria West forms the starting point of the Diamond Way and lies on the main route from Cape Town to Kimberley. Diamond fever was sparked in 1866 with the discovery at Hopetown and then at Kimberley. The Pixley Ka Seme District Municipality Spatial Development Framework identifies Victoria West as an Urban Centre. These towns are administrative centres within the respective eight municipalities in the district. These centres' administrative functions should be further enhanced, and it is recommended that programs for urban rehabilitation of these centres should focus on the stimulation of economic growth in these areas. The economy of the town is linked to providing services to the surrounding farming areas and through traffic associated with the N12 and R63.
The landscape associated with the site is a typical Karoo landscape consisting of dolerite koppies and ridges separated by valley bottoms. The land uses are linked to livestock farming. The character of the area can be described as a rural, Karoo landscape. There are a number of farm dwellings located in the vicinity of the site, including three farm dwellings within the boundary of the site. Most of the farm dwellings are located in the area to the west and north of the site. The Rondavel Guest Farm is located adjacent to the N1, within the boundary of the site.

CHAPTER 7: ASSESSMENT OF POTENTIAL IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) expected to be associated with the Great Karoo EGI. This assessment has considered the construction of a 132kV collector substation, and 132kV power line. The permanent development footprint of the collector substation is ~1000mx700m in extent. The power line corridor is 1km wide and approximately 37.5km long. The proposed 132kV power line will be placed within the power line corridor and will have a servitude of 40m. During construction, a permanent access road along the length of the power line corridor between 4 - 6m wide will be established to allow for large crane movement. Additional infrastructure associated with the Great Karoo EGI will include equipment, infrastructure, buildings, and temporary and permanent laydown areas.

The full extent of the 1km wide power line corridor and the footprint of the collector substation were considered through the BA process and within the specialist assessments undertaken as part of the BA process (refer to **Figure 7.1**).

The sections which follow provide a summary of the specialist input for each field of study in terms of the impacts which are expected to occur, the significance of the impacts, the opportunity for mitigation of the impacts to an acceptable level and the appropriate mitigation measures recommended for the reduction of the impact significance. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities for the majority of the environmental aspects. Therefore, in some instances, these impacts are not considered separately within this chapter. This section of the report must be read together with the detailed specialist studies contained in **Appendix D** to **J.**

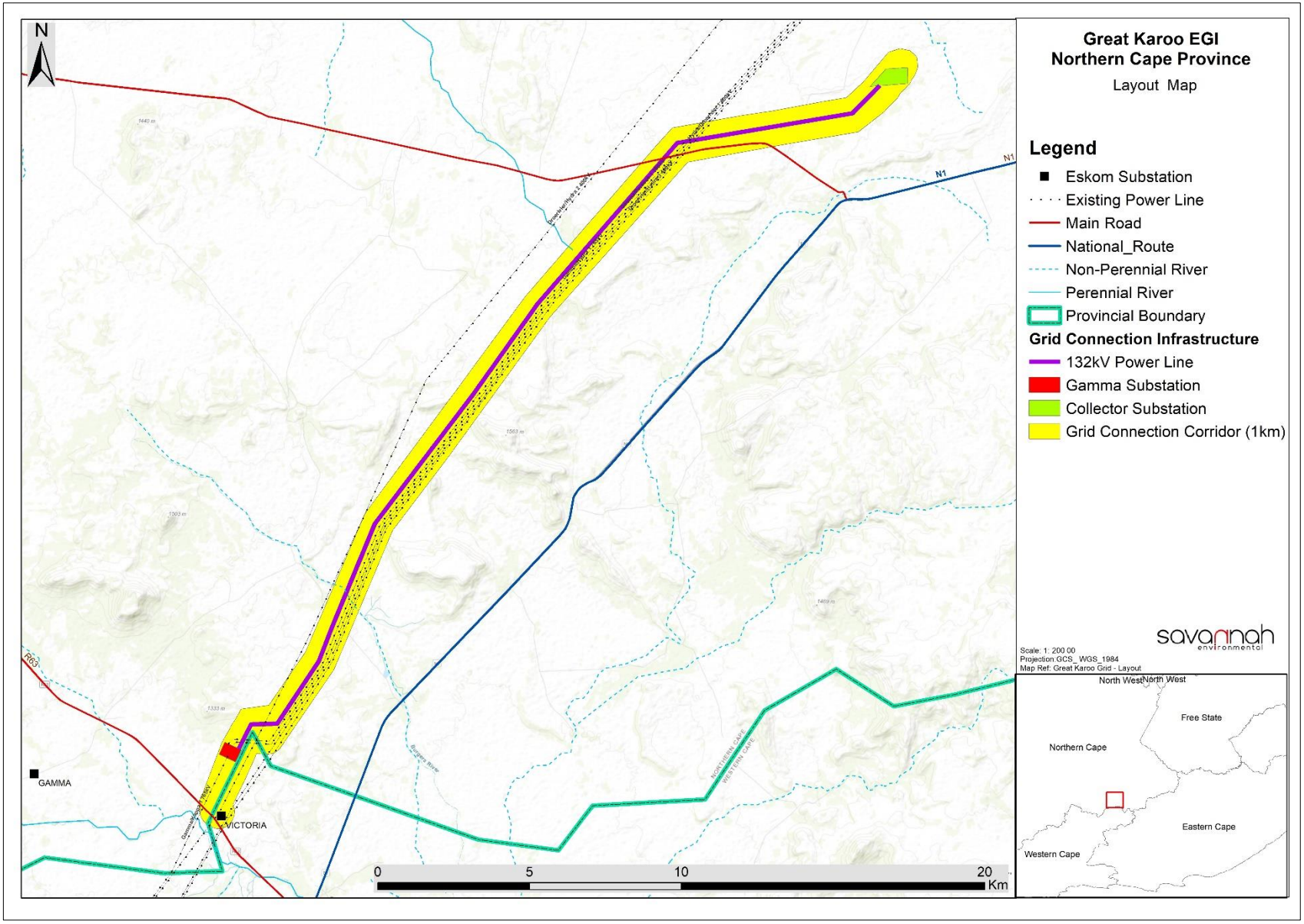


Figure 7.1: Map showing the collector substation footprint and power line corridor assessed as part of this BA process.

The development of the Great Karoo EGI will comprise the following phases:

» ***Pre-Construction and Construction*** – will include pre-construction surveys; site preparation; establishment of laydown areas and temporary security building; construction of foundations involving excavations and cement pouring; the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; and commissioning of new equipment and site rehabilitation. The construction phase for the Great Karoo EGI is estimated to be up to 12 - 18 months.

» ***Operation*** – will include the operation of the grid connection infrastructure (i.e., the 132kV collector substation and power line). The operation phase is expected to be ~ 20 – 25 years (with maintenance), or longer as required for the operation of the renewable energy facilities.

» ***Decommissioning*** – at the end of the infrastructure's economic life, or when no longer required, decommissioning will include site preparation, disassembling of the components, clearance of the relevant infrastructure within the collector substation development footprint and power line corridor, and rehabilitation.

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 the EIA Regulations, 2014 - Appendix 1: Content of the Basic Assessment 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 risks associated with the development of the Great Karoo EGI, 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 7.3. to 7.9.**
3(h)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The positive and negative impacts associated with the development of the Great Karoo EGI are included in **sections 7.3. to 7.9.**
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 Great Karoo EGI are included in **sections 7.3. to 7.9.**
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 the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	A description of all environmental impacts identified for the Great Karoo EGI 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 7.3. to 7.9.**

Requirement	Relevant Section
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 Great Karoo EGI, 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 7.3. to 7.9.**
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 7.3. to 7.9.**
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 Great Karoo EGI are included and assessed in **section 7.10**.

7.2. Quantification of Areas of Disturbance on the Site

Site-specific impacts associated with the construction and operation of the Great Karoo EGI relate to the direct loss of indigenous vegetation, loss of land capability, watercourse disturbance/loss, displacement of and electrocution of avifauna, impacts on heritage and palaeontological resources and the cultural landscape, visual impacts and negative and positive impacts on the social environment. In order to assess the impacts associated with the Great Karoo EGI, it is necessary to understand the extent of the affected area.

A permanent development footprint of 19.95ha has been identified for the placement of the collector substation. The power line corridor is approximately 1km wide and approximately 37.5km long, with a servitude of up to 40m.

It should be noted that the site currently has existing access roads which are used for farming activities and travel through the area. It is planned that where existing access roads are able to be utilised within the development footprint, these should be utilised, essentially reducing the extent of disturbance resulting from access road construction.

7.3 Assessment of Impacts on Ecology (Flora and Fauna)

The development of the project is likely to result in a variety of impacts associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as service areas, and operations buildings etc. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details).

7.3.1. Results of the Ecology Impact Assessment

The study area consists mostly of natural habitat that is used for commercial animal husbandry. There are existing transmission power lines running across the site with associated access tracks as well infrastructure

associated with a farmstead (Rondavel), but no other infrastructure on site. Existing impacts on natural habitat are related to grazing effects and erosion in lowland areas. The proposal to build grid connection infrastructure will therefore have some effects on natural habitat. The existing biodiversity on site is, however, relatively limited in terms of uniqueness or potential presence of species of concern, with the possible presence of one Critically Endangered mammal species.

The vegetation on site is not considered to be part of any threatened ecosystem and has not been assessed as being of high conservation value due to rates of transformation. The regional vegetation types that occur on site, i.e., Eastern Upper Karoo and Upper Karoo Hardeveld, are both widespread and have low rates of transformation across their geographical range. There are three plant species of conservation concern that could possibly occur on site, but none were seen during general field surveys.

To determine sensitivity on site, local and regional factors were taken into account. There are some habitats on site that have been described as sensitive in their own right, irrespective of regional assessments. This includes primarily the dry stream beds and associated riparian zones. Rocky outcrops and steep slopes are more sensitive than surrounding areas, mainly due to higher floristic diversity and the likelihood of plant species with low local abundance occurring there.

At a regional level, the Critical Biodiversity Area (CBA) map for Northern Cape indicates one drainage line, along with a buffer on each side, that is designated as being a CBA1 area. The remaining drainage lines of the study area are indicated as being Ecological Support Areas (ESAs).

In terms of other species of concern and overall biological diversity, including both plants and animals, the low hills and mountain ranges are the areas with the most species as well as being most likely to contain any species of concern. However, the southern main drainage line is the most likely habitat for the Critically Endangered Riverine Rabbit, if it occurs on site, which is unknown but possible.

A summary of sensitivities that occur on site and that may be vulnerable to damage from the proposed project are as follows:

- Drainage lines/CBA1 (high – very high sensitivity)
- Mountain slopes (medium – high sensitivity)
- Karroid plains (medium sensitivity)
- Infrastructure (roads) (low sensitivity)

Based on this information, a map of habitat sensitivity on site is provided in **Figure 7.2.**

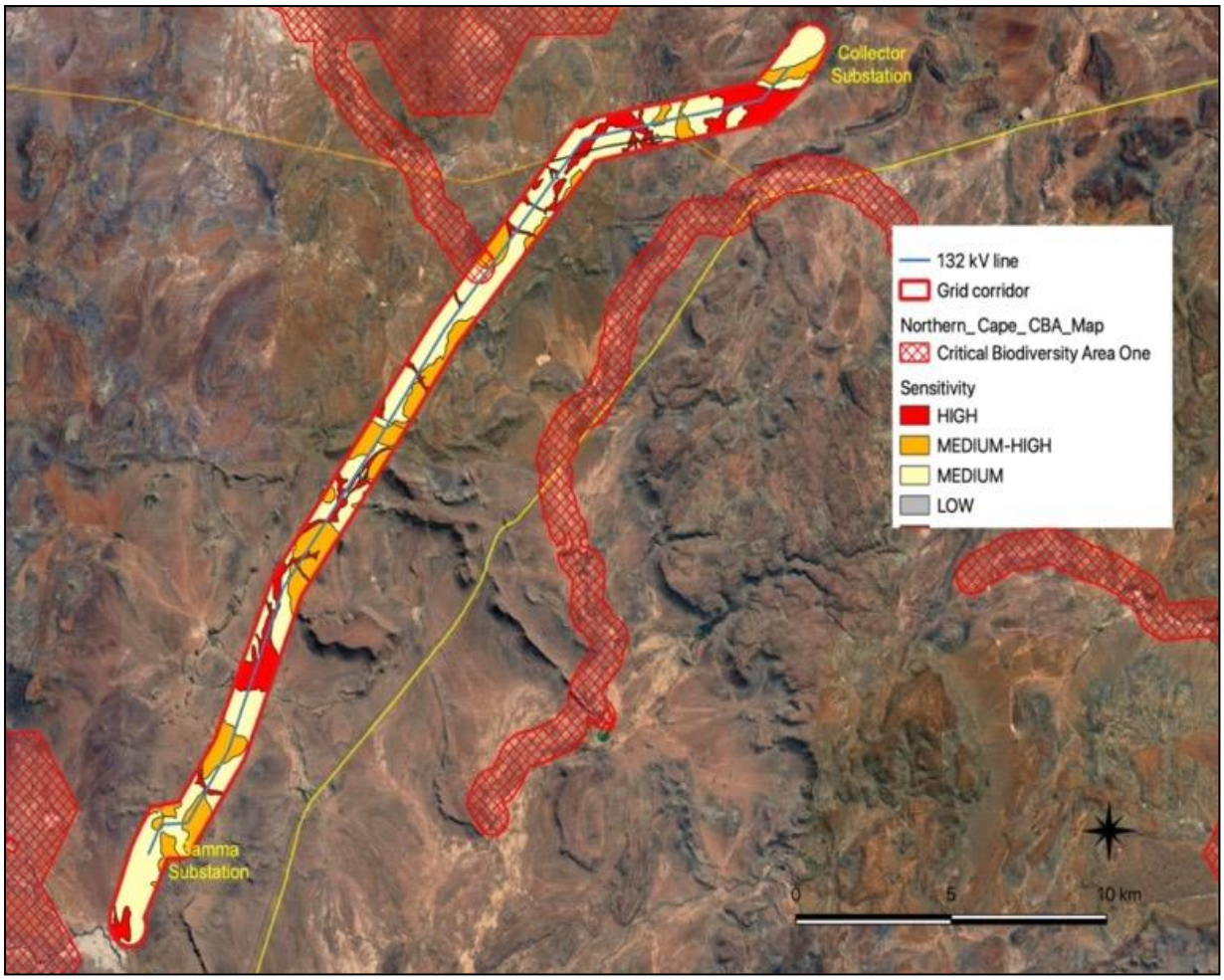


Figure 7.2: Habitat sensitivity within the grid connection corridor

7.3.2. Description of Impacts on Ecology

A summary of the potential ecological issues for the study area is as follows:

- Presence of natural vegetation on site, a small part of which has high conservation value due to being within Critical Biodiversity Areas (CBA1). Designated-natural vegetation on site is vulnerable to disturbance, especially direct habitat loss and habitat fragmentation.
- Possible presence of Critically Endangered mammal on site (assessed separately).
- Presence of dry stream beds and associated riparian vegetation on site, assessed as being sensitive to impacts associated with development as well as being important habitat for various plant and animal species.
- Presence of various plant species protected according to the Northern Cape Nature Conservation Act (Act 9 of 2009) (assessed separately). The identity of such species requires detailed floristic surveys within the footprint of the proposed project.
- Potential invasion of natural habitats by alien invasive plants, thus causing additional impacts on biodiversity features.

Direct and indirect Impacts associated with the construction, operation and decommissioning phases of the proposed grid connection infrastructure on ecology include the following:

Construction Phase:

Direct impacts:
» Loss and/or fragmentation of indigenous natural vegetation due to clearing.

Indirect impacts:
» Establishment and spread of alien invasive plants due to the clearing and disturbance of indigenous vegetation; and
» Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and compaction of surfaces, leading to changes in downslope areas.

Operation Phase:

Direct impacts:
» Continued disturbance to natural habitats due to general operational activities and maintenance.

Indirect impacts:
» Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors; and
» Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape.

Decommissioning Phase:

Direct impacts:
» Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites.

Indirect impacts:
» Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors; and
» Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape.

7.3.3. Impact tables summarising the significance of impacts on ecology during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: Direct loss and/or fragmentation of indigenous natural vegetation The impact will occur due to clearing of natural habitat for construction of infrastructure.		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Minor (2)	Minor (1)
Probability	Definite (5)	Definite (5)
Significance	**Medium (35)**	**Low (25)**

Status (positive or negative)	Negative
Reversibility	Partly reversible
Irreplaceable loss of resources?	Marginal
Can impacts be mitigated?	It is not possible to completely avoid impacts on indigenous vegetation for this project.

Mitigation:

» Restrict impact to development footprint only and limit disturbance creeping into surrounding areas.
» As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores.
» Avoid sensitive features and habitats when locating infrastructure.
» Compile a Rehabilitation Plan.
» Compile an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas.
» Where possible, access roads should be located along existing farm and district roads.
» Access to sensitive areas should be limited during construction.
» Undertake monitoring to evaluate whether further measures would be required to manage impacts.
» Footprints of infrastructure, laydown areas, construction sites, roads and substation sites should be clearly demarcated.
» No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities, unless for maintenance purposes, in which case all reasonable steps should be taken to limit damage to natural areas.
» No driving of vehicles off-road outside of construction areas.
» Limit clearing of natural habitat designated as sensitive, especially rocky outcrops, cliffs and riparian habitats, where possible.
» Personnel and vehicles should be restricted to acess roads and no off-road driving should occur.

Residual Impacts:

There is residual risk on the basis that construction crews are unlikely to remain within the confines of the demarcated construction zone. There is always likely to be "spillage" into surrounding areas, or movement of personnel and/or machinery into areas beyond the footprint of the proposed project.

Nature: Impact on Integrity of Critical Biodiversity Areas

The impact will occur due to clearing of natural habitat for construction of infrastructure and will result in loss of natural areas within designated CBA1 areas.

	Without mitigation	**With mitigation**
Extent	Regional (4)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (14)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	

Mitigation:

» Choose alternatives outside of CBA1 areas.
» Place tower structures as far as possible away from the point of origin of the drainage line that constitutes the core of the CBA1 area (this point is approximately at 31o31'36.1"S, 23o31'28"E).
» Locate linear infrastructure outside boundaries of CBA1 areas, except where these are located entirely within existing disturbance and/or transformation.

» Use the existing service roads under the existing power line to access towers at this particular location.
Residual Impacts:
There is residual risk on the basis that construction crews are unlikely to remain within the confines of the demarcated construction zone. There is always likely to be "spillage" into surrounding areas, or movement of personnel and/or machinery into areas beyond the footprint of the proposed project.

Nature: Loss of individuals of Species of Conservation Concern due to clearing for construction

The impact will occur due to clearing of indigenous vegetation for the purposes of construction of infrastructure.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Minor (2)
Probability	Probable (3)	Very improbable (1)
Significance	**Medium (45)**	**Low (9)**
Status (positive or negative)	Negative	
Reversibility	Irreversible	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	

Mitigation:

» A detailed pre-construction walk-through survey will be required during a favourable season to locate any individuals of protected plants, as well as for any populations of threatened plant species. This survey must cover the footprint of all approved infrastructure, including internal service roads and footprints of tower structures (final infrastructure layout). The best season is early to late Summer, but dependent on recent rainfall and vegetation growth.
» Where significant populations of SCC are found, shift infrastructure to avoid direct impacts.
» Compile a Plant Rescue Plan to be approved by the appropriate authorities.
» Undertake monitoring to evaluate whether further measures would be required to manage impacts.
» Obtain the necessary permits for specimens or protected plant species that will be lost due to construction of the project.
» For any plants that are transplanted, annual monitoring should take place to assess survival. This should be undertaken for a period of three years after translocation and be undertaken by a qualified botanist. The monitoring programme must be designed prior to translocation of plants and should include control sites (areas not disturbed by the project) to evaluate mortality relative to wild populations.
» No collecting or poaching of any plant species must be permitted on site.
» Loss of protected species of conservation concern must be report to the conservation authorities.
» Personnel must be educated about protection status of species, including distinguishing features, to be able to identify protected species.
» Implement strict access control for the site.
» Report any illegal collection to conservation authorities.
» The location of all transplanted rescued plants must be recorded, along with the identity of the plant.

Residual Impacts:

There is some residual risk on the basis that SCC are often difficult to locate in the field and could be overlooked during a walk-through survey. The risk is dependent on the competence and diligence of the botanist undertaking the walk-through survey, and the degree to which resources are limited in support of the walk-down survey.

Nature: Establishment and spread of declared weeds and alien invader

The impact will occur due to alien invader plants immigrating into the site, becoming established and spreading, which degrades and displaces indigenous natural habitat.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (40)**	**Low (28)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	

Mitigation:

» Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.
» Undertake regular monitoring to detect alien invasions early so that they can be controlled.
» Implement control measures for declared weeds and alien invader plants.

Residual Impacts:

Due to the high number of alien invader plant species in the country, the problem of local invasion is pervasive. Seasonal climate conditions make it unpredictable which species are likely to spread at any particular time. Any drop in focus on this problem can lead to breakaway invasion.

Nature: Increased runoff and erosion

Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and compaction of surfaces, leading to impacts on downslope areas.

	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (18)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	

Mitigation:

» Compile and implement a stormwater management plan.
» Keep gradients of roads adequately low to minimise erosion.
» Align roads to avoid steep slopes and avoid the necessity for significant cuts and fills.
» Monitor road surfaces for erosion and repair or upgrade, where necessary.
» Ensure all possible steps are taken to limit erosion of surfaces, including proper management of storm-water runoff.
» Speed limits should be set for all roads on site, as well as access roads to the site. These limits should not exceed 40 km/h, but may be set lower, depending on local circumstances. Strict enforcement of speed limits should occur – install speed control measures, such as speed humps, if necessary.
» Maintain adequate buffer zones around hydrological features so that these do not become degraded from runoff and erosion.
» Compile and implement a Stormwater Management Plan, which highlights control priorities and areas and provides a programme for long-term control.

Residual Impacts: Extreme rainfall events are likely to render any control measures irrelevant.

Operation Phase Impacts

Nature: Continued disturbance/degradation of habitat.		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (3)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (24)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	
Mitigation: » Restrict activities to infrastructure locations only and limit disturbance creeping into surrounding areas. » Protect sensitive features and habitats during operational activities. » Implement and monitor Rehabilitation Plan. » Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. » Access to sensitive areas must be enforced. » Undertake monitoring to evaluate whether further measures would be required to manage impacts. » No additional clearing of vegetation should take place during the operational phase without a proper assessment of the environmental impacts and authorization from relevant authorities, unless for maintenance purposes, in which case all reasonable steps should be taken to limit damage to natural areas.		
Residual Impacts: There is residual risk on the basis that maintenance personnel are unlikely to remain within the confines of the demarcated project area. There is always likely to be "spillage" into surrounding areas, or movement of personnel and/or machinery into areas beyond the footprint of the proposed project.		

Nature: Continued establishment and spread of alien invasive plants The impact will occur due to alien invader plants immigrating into the site, becoming established and spreading, which degrades and displaces indigenous natural habitat.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Site (1)
Duration	Long-term	Long-term (4)
Magnitude	Medium (6)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (48)**	**Low (28)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	
Mitigation: » Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. » Undertake regular monitoring to detect alien invasions early so that they can be controlled. » Implement control measures for declared weeds and alien invader plants.		

Residual Impacts: Due to the high number of alien invader plant species in the country, the problem of local invasion is pervasive. Seasonal climate conditions make it unpredictable which species are likely to spread at any particular time. Any drop in focus on this problem can lead to breakaway invasion.

Nature: Continued impacts due to runoff and erosion

Increased runoff and erosion due to clearing of vegetation, construction of hard surfaces and compaction of surfaces, leading to impacts on downslope areas.

	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (18)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	

Mitigation:

- Implement a stormwater management plan.
- Monitor road surfaces for erosion and repair or upgrade, where necessary.
- Install additional flood and/or erosion control measures, where necessary.
- Speed limits should be set for all roads on site, as well as access roads to the site. These limits should not exceed 40 km/h, but may be set lower, depending on local circumstances. Strict enforcement of speed limits should occur – install speed control measures, such as speed humps, if necessary.
- Maintain adequate buffer zones around hydrological features so that these do not become degraded from runoff and erosion.
- Surface runoff and erosion must be properly controlled during the operational phase, and any issues addressed as quickly as possible.

Residual Impacts:

Extreme rainfall events are likely to render any control measures irrelevant.

Decommissioning Phase Impacts

Nature: Disturbance and/or degradation of habitat due to removal of infrastructure

	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (3)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (24)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	

Mitigation:

- Restrict activities to infrastructure locations only and limit disturbance creeping into surrounding areas.
- Protect sensitive features and habitats during decommissioning activities.
- Implement and monitor Rehabilitation Plan.

» Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. » Access to sensitive areas must be enforced. » Undertake monitoring to evaluate whether further measures would be required to manage impacts.
Residual Impacts: There is residual risk on the basis that de-construction teams are unlikely to remain within the confines of the demarcated project area. There is always likely to be "spillage" into surrounding areas, or movement of personnel and/or machinery into areas beyond the footprint of the proposed project.

Nature: Continued establishment and spread of alien invasive plants The impact will occur due to alien invader plants immigrating into the site, becoming established and spreading, which degrades and displaces indigenous natural habitat.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Medium (6)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (48)**	**Low (28)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	
Mitigation: » Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. » Undertake regular monitoring to detect alien invasions early so that they can be controlled. » Implement control measures for declared weeds and alien invader plants. » Do NOT use any alien plants during rehabilitation.		
Residual Impacts: Due to the high number of alien invader plant species in the country, the problem of local invasion is pervasive. Seasonal climate conditions make it unpredictable which species are likely to spread at any particular time. Any drop in focus on this problem can lead to breakaway invasion.		

Nature: Continued impacts due to runoff and erosion		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (18)**
Status (positive or negative)	Negative	
Reversibility	Partly reversible	
Irreplaceable loss of resources?	Marginal	
Can impacts be mitigated?	Yes	
Mitigation: » Implement a stormwater management plan. » Implement a rehabilitation plan. » Monitor road surfaces for erosion and repair or upgrade, where necessary. » Install additional flood and/or erosion control measures, where necessary.		

» Ensure all possible steps are taken to limit erosion of surfaces, including proper management of storm-water runoff. » Speed limits should be set for all roads on site, as well as access roads to the site. These limits should not exceed 40 km/h, but may be set lower, depending on local circumstances. Strict enforcement of speed limits should occur – install speed control measures, such as speed humps, if necessary. » Maintain adequate buffer zones around hydrological features so that these do not become degraded from runoff and erosion.
Residual Impacts: Extreme rainfall events are likely to render any control measures irrelevant.

7.3.4. Overall Result

The terrestrial ecology impact assessment identified four potential negative impacts due to construction or operation of the proposed grid connection infrastructure. The potential impacts are as follows:

» Direct loss of vegetation. For power lines, the main impact on terrestrial ecosystems is due to construction of towers and service roads. The placement of towers and service roads is therefore critical in limiting impacts. Placement adjacent to existing power lines if preferable.
» Impacts on CBA1 areas. There is a CBA1 area in the northern part of the corridor that is very marginally affected by proposed infrastructure. It can, however, be avoided.
» Introduction and/or spread of declared weeds and alien invasive plants in terrestrial habitats. This can lead to additional degradation of natural areas.
» Runoff and erosion due to creation of hard surfaces. This can lead to downslope impacts that can cause additional degradation beyond the direct footprint of proposed infrastructure.

An assessment of these impacts indicates that they will have a significance of low or medium. If appropriate mitigation measures are put in place, all impacts can be reduced to having low significance after mitigation. On the basis of this assessment, the opinion is that the project should be able to proceed on condition the recommended mitigation measures are put in place to minimise predicted impacts.

7.4 Assessment of Impacts on Aquatic Ecology

The development of the Great Karoo EGI is likely to result in a variety of impacts from an aquatic perspective. Potential Impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details)

7.4.1. Results of the Aquatic Impact Assessment

Based on a combination of desktop and in-field delineation, three (3) forms of a watercourses were identified and delineated within the corridor (refer to **Figure 6.14**). These include episodic rivers, drainage lines and dams. No natural wetland systems, or even cryptic wetlands were identified for the project area. Episodic rivers refer to systems formed from run-off channels in very dry regions. The rivers and drainage lines are both classified as a river hydrogeomorphic (HGM) type systems. The dams are regarded as artificial systems and typically formed / created in the preferential flow paths of the river HGM types. The drainage lines are not characterised by riparian vegetation and grasses. These systems represent bare surfaces with evidence of surface run-off.

The results of the habitat assessment indicate natural (class A) and largely natural (class B) instream and riparian conditions for the catchment, respectively. The overall ecological importance and sensitivity for the area was determined to be high. The overall ecosystem service benefit for the system is moderate.

The recommended buffer was calculated to be 15m for the drainage lines and rivers for the construction and operational phases.

7.4.2. Description of Aquatic Impacts

Construction Phase

The following potential main impacts on the watercourses were considered for the construction phase of the proposed project. Similar impacts are expected for the decommissioning phase and can be jointly considered. This phase refers to the period when the proposed features are constructed. Construction could result in the encroachment into watercourses and result in the loss or degradation of these systems, most of which are functional and provide ecological services. Watercourses are also likely to be traversed by roads and other linear infrastructure which might create a barrier to flow and biotic movement across the systems. These disturbances could also result in infestation, and establishment of alien vegetation would affect the functioning of the systems. During construction, earthworks will expose and mobilise earth materials which could result in sedimentation of the receiving systems. A number of machines, vehicles and equipment will be required for the phase, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of the receiving water resources. Contaminated water resources are likely to have an effect on the associated biota. The following potential impacts during site clearing and preparation were considered:

- Watercourse disturbance / loss:
  - Direct disturbance / degradation / loss to soils or vegetation due to the construction of the infrastructure.
- Water runoff from construction site:
  - Increased erosion and sedimentation; and
  - Contamination of receiving water resources.

Operation Phase

The operational phase refers to the phase when construction activities have been completed and the infrastructure is functional. It is anticipated that most adverse effects will be encountered during the construction phase, allowing the systems to recover during the operational phase of the project. It is likely that all rivers and their associated buffers can be avoided, and that the placement of infrastructure can be kept to a minimum. The following potential impacts were considered:

- Hardened surfaces:
  - Potential for increased stormwater runoff, leading to increased erosion and sedimentation.
- Contamination:
  - Potential for increased contaminants entering the watercourses.

7.4.3. Impact tables summarising the significance of impacts on aquatic ecology during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: Watercourse disturbance / loss Direct disturbance / degradation / loss to soils or vegetation due to the construction of the powerline		
	Without mitigation	**With mitigation**
Extent	Regional (3)	Local (2)
Duration	Moderate term (3)	Moderate term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Medium (36)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, avoidance of watercourses is possible.	

Mitigation:

» Avoid direct impacts to water resources and their associated 15m buffer width.
» Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area.
» When clearing vegetation, allow for some vegetation cover as opposed to bare areas.
» Minimize the disturbance footprint and unnecessary clearing of vegetation outside of the construction footprint.
» Use the shapefiles to signpost the edge of the watercourses closest to site. Place the sign 15 m from the edge (stating this is the buffer zone). Label these areas as environmentally sensitive areas, keep out.
» Educate staff and relevant contractors on the location and importance of the identified watercourses through toolbox talks and by including them in site inductions and the overall master plan.
» All activities (including driving) must adhere to the respective buffer areas.
» Promptly remove / control all alien invasive plants (AIPs) that may emerge during construction (i.e. weedy annuals and other alien forbs).
» All alien vegetation along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the CARA and IAP regulations.
» Landscape and re-vegetate all denuded areas as soon as possible.
» Implement a suitable stormwater management plan. Priority must be the return of clean water to the resources, avoiding scouring or erosion at any discharge locations.

Residual Impacts:

Notable disturbances are expected for the construction phase. However, with correctly placed infrastructure, the hydrology of the system will recover during the operational phase. The residual impact is expected to be low.

Nature: Water runoff from construction site Increased erosion and sedimentation & contamination of resources		
	Without mitigation	**With mitigation**
Extent	Regional (3)	Local (2)

Nature: Water runoff from construction site Increased erosion and sedimentation & contamination of resources		
Duration	Moderate term (3)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» The contractors used during the construction phase should have spill kits available to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly.
» All construction activities must be restricted to the development footprint area.
» During construction activities, all rubble generated must be kept in a skip (or similar) and removed from the site to a licensed facility.
» Construction vehicles and machinery must make use of existing access routes as much as possible.
» All chemicals and toxicants to be used during the construction phase must be stored in a bunded area.
» All machinery and equipment should be inspected regularly for faults and possible leaks; these should be serviced off-site at designed areas.
» All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping".
» Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation).
» All removed soil and material stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.
» No dumping of material on site may take place.
» Implement a suitable stormwater management plan. Ensure the separation of clean and dirty water.
» All waste generated on site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.
» No activities are permitted within the watercourses and associated buffer areas unless these are for crossings.
» Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.

Residual Impacts:
Long term broad scale erosion and sedimentation, and contamination of watercourses. The residual impact is expected to be low.

Operational Phase Impacts

Impact Nature: Watercourse disturbance Direct disturbance / degradation to soils or vegetation due to the operation and maintenance of the powerline and substation		
	Without mitigation	**With mitigation**
Extent	Regional (3)	Local (2)

Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, avoidance of watercourses is possible.	
Mitigation: » Monitor and maintain stormwater management features. » No activities are permitted within the watercourses and associated buffer areas. » Monitor and maintain all landscaped and re-vegetated areas.		
Residual Impacts: With correctly placed infrastructure, the hydrology of the system will not be affected during the operational phase. The residual impact is expected to be low.		

7.4.4 Overall Result

The pre-mitigation impact significance for all considered aspects is expected to be medium. The expected post-mitigation impact significance is expected to be low, should all mitigation measures and recommendations be implemented.

It is the opinion of the specialist that no fatal flaws are evident for the project. Due to the expected low port-mitigating risks, the project qualifies for a General Authorisation.

7.5 Assessment of Impacts on Avifauna

Various impacts have been identified to be associated with the development of the Great Karoo EGI from an avifaunal perspective. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** for more details)

7.5.1. Results of the Avifauna Impact Assessment

The SABAP2 data indicates that a total of 167 bird species could potentially occur within the study area and immediate surroundings (Appendix 1 of the avifauna report provides a comprehensive list of all the species). Of these, 49 species are classified as priority species and 12 of these are South African Red List species. Of the priority species, 35 are likely to occur regularly at the study area and immediate surrounding area, and another 14 could occur sporadically.

An integrated pre-construction monitoring programme was implemented at the proposed Great Karoo Cluster of Renewable Energy Facilities (i.e., Kwana, Moriri and Nku Solar Energy Facilities (SEF) and Angora and Merino Wind Energy Facilities (WEF)) between October 2020 and November 2021. The programme comprised of six seasonal surveys of both the proposed study areas and an identified control site within the broader study area. In order to describe the avifaunal community present, a concerted effort was made to

sample the avifauna in all of the primary habitats that were available by applying walked and driven transects, vantage point, focal point and incidental survey techniques.

The surveys produced a combined list of 113 species (Appendix 3) covering both the Great Karoo Cluster of Renewable Energy Facilities study area and to a limited extent, the surrounding area. Blue Crane (n=296), Karoo Korhaan *Eupodotis vigorsii* (n=51), Northern Black Korhaan *Afrotis afraoides* (n=49) and Southern Pale-chanting Goshawk *Melierax canorus* (n=24) were recorded in the largest abundances. Other notable observations included, Eleven (11) Verreaux's Eagle, four (4) Tawny Eagle and two (2) Martial Eagle nest locations. Relevant to this assessment, the two (2) Martial Eagle and two (2) Tawny Eagle nests present on the existing TX infrastructure (refer to **Figure 7.3**), that are aligned parallel to the proposed 132kV double circuit power line, are of particular importance. Although part of the southern portion of the 132kV power line corridor could not be surveyed due to time constraints, the identified microhabitats and existing power line infrastructure occur throughout the Great Karoo EGI study area and are likely to support an identical suite of priority species. All other observations were of small passerine, waterbird and wader species.

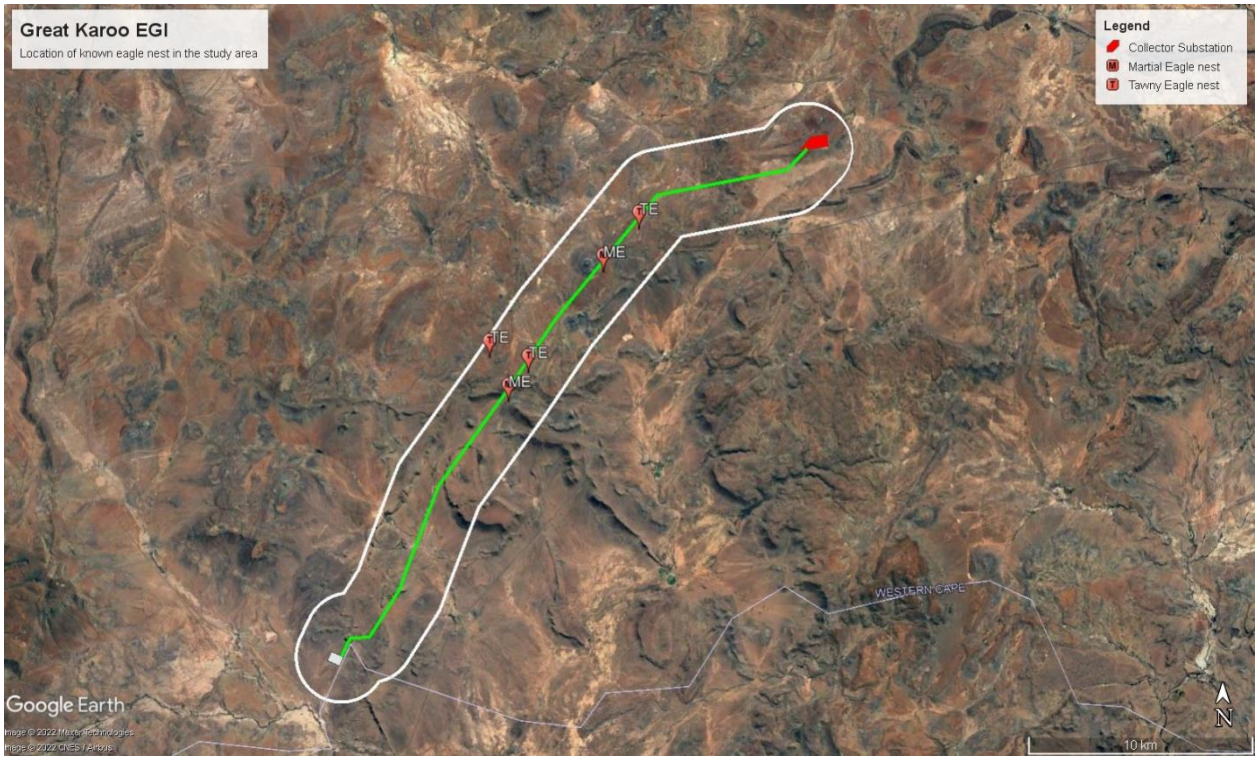


Figure 7.3: Known priority species nest locations within the study area

At a site-specific level, environmentally sensitive features present within the proposed study area include the existing eagle nests, in addition to permanent and ephemeral waterbodies. These areas are classified as areas of **HIGH** sensitivity. Construction in the areas containing eagle nests will need to be carefully managed to ensure minimal disturbance to the breeding birds and/or their progeny. The construction of the proposed power line across or within close proximity to the waterbodies will necessitate the marking of the power line with bird flight diverters to mitigate the collision impact. Site specific recommendations for the management of the disturbance and collision impacts associated with these **HIGH** sensitivity areas will be provided following the pre-construction avifaunal walk-through (inspection). The remainder of the study area is considered to be of **MEDIUM** sensitivity, given its propensity to support Ludwig's Bustard.

7.5.2. Description of Impacts on Avifauna

Negative impacts on avifauna by electricity infrastructure generally take two (2) main forms, namely electrocution and collisions. Displacement due to habitat destruction and disturbance associated with the construction of the electricity infrastructure and other associated infrastructure is another impact that could potentially impact on avifauna.

The following potential impacts have been identified:

Construction Phase

» Displacement due to disturbance associated with the construction of the 132kV central collector substation, associated infrastructure and 132kV double circuit power line; and
» Displacement due to habitat transformation associated with the construction of the 132kV central collector substation, associated infrastructure and to a lesser extent the 132kV double circuit power line.

Operation Phase

» Collisions with the 132kV double circuit power line;
» Electrocutions within the substation yard; and
» Electrocution of vultures on the 132kV power line infrastructure.

Decommissioning Phase

» Displacement due to disturbance associated with the decommissioning of the 132kV central collector substation, associated infrastructure and 132kV double circuit power line.

7.5.3. Impact tables summarising the significance of impacts on avifauna during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: Displacement of priority species due to disturbance associated with construction of the Great Karoo EGI 132kV central collector substation and 132kV overhead power line.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Very short (1)	Very short (1)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (44)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: » Conduct a pre-construction inspection (avifaunal walk-through) of the final central collector substation layout and power line alignment to identify priority species that may be breeding within the substation area		

and to record the status of the eagle nests on the existing transmission power lines. If a nest is occupied, the avifaunal specialist must consult with the contractor to find ways of minimising the potential disturbance to the breeding pair of eagles during the construction period. This could include measures such as delaying some of the activities until after the breeding season. » Construction activity should be restricted to the immediate footprint of the infrastructure. » Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. » Measures to control noise and dust should be applied according to current best practice in the industry. » Maximum used should be made of existing access roads and the construction of new roads should be kept to a minimum.
Residual Risks: The residual risk of displacement will be reduced to a low level after mitigation, if the proposed mitigation measures are implemented.

Nature: Displacement of priority species due to habitat transformation associated with construction of the Great Karoo EGI 132kV central collector substation and 132kV overhead power line.		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	To a limited extent	
Mitigation: » Vegetation clearance should be limited to what is absolutely necessary. » The mitigation measures proposed by the biodiversity specialist must be strictly enforced.		
Residual Risks: The residual risk of displacement will be further reduced after mitigation.		

Operation Phase Impacts

Nature: Mortality of priority species due to collisions with the Great Karoo EGI 132kV power line		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (56)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		

» The avifaunal specialist must conduct a walk-through prior to implementation to demarcate sections of power line that need to be marked with Eskom approved bird flight diverters. The bird flight diverters should be installed on the full span length on the earthwire (according to Eskom guidelines - five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively. These devices must be installed as soon as the conductors are strung.
Residual Risks:
There will be an ongoing residual risk of collisions with the grid connection power line, but mitigation should make a marked difference.

Nature: Mortality of priority species due to electrocution within the Great Karoo EGI central collector substation		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (8)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (42)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
» The hardware within the proposed central collector substation yard is too complex to warrant any mitigation for electrocution at this stage. It is recommended that if on-going impacts are recorded once operational, site-specific mitigation (insulation) be applied reactively. This is an acceptable approach because Red List priority species are unlikely to frequent the switching station and substation and be electrocuted.		
Residual Risks:		
The residual risk of electrocution will be low once mitigation is implemented.		

Nature: Mortality of priority species due to electrocution on the 132kV power line infrastructure		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (8)	Low (4)
Probability	Probable (3)	Very improbable (1)
Significance	**Medium (42)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
» Construction of the power line must be undertaken using an approved bird friendly pole/tower design in accordance with the Distribution Technical Bulletin relating to bird friendly structures. The avifaunal specialist must sign off on the final design.		
Residual Risks:		
The residual risk of electrocution will be low once mitigation is implemented.		

Decommissioning Phase Impacts

Nature: Displacement of priority species due to disturbance associated with decommissioning of the Great Karoo EGI 132kV central collector substation and 132kV overhead power line.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Very short (1)	Very short (1)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (44)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: » The existing transmission lines must be inspected for active raptor nests prior to the commencement of the decommissioning activities. Should any active nests be present, decommissioning activities during the breeding season should be avoided, if possible. » Decommissioning activity should be restricted to the immediate footprint of the infrastructure as far as possible. » Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. » Measures to control noise and dust should be applied according to current best practice in the industry. » Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.		
Residual Risks: The residual risk of displacement will be reduced to a low level after mitigation, if the proposed mitigation is implemented.		

7.5.4. Overall Result

The expected impacts of the Great Karoo EGI 132kV central collector substation and 132kV overhead power line were rated to be of MEDIUM significance and negative status pre-mitigation. However, with appropriate mitigation, the overall post-mitigation significance of the identified impacts should be reduced to LOW negative. No fatal flaws were discovered in the course of the investigation. It is therefore recommended that the activity is authorised, on condition that the proposed mitigation measures are strictly implemented.

7.6 Assessment of Impacts on Land Use, Soils and Agricultural Potential

The development of the Great Karoo EGI is likely to result in a variety of impacts on soils within the grid corridor and substation footprint. Potential Impacts and the relative significance of the impacts are summarised below (refer to **Appendix G** for more details)

7.6.1 Results of the Land Use, Soils and Agricultural Potential Impact Assessment

Various soil forms were identified within the project area with the most sensitive soils being classified as the Tubatse, Oakleaf and Bethesda soil forms. These soil forms have been determined to be associated with one

land capability, namely LCIII (grazing land). This land capability class was then further refined to a land potential level 6 by comparing land capability of climatic capabilities of the project area.

This land potential level was used to determine the sensitivities of soil resources. Only "Low" sensitivities were determined throughout the project area by means of baseline findings (refer to **Figure 7.4**).

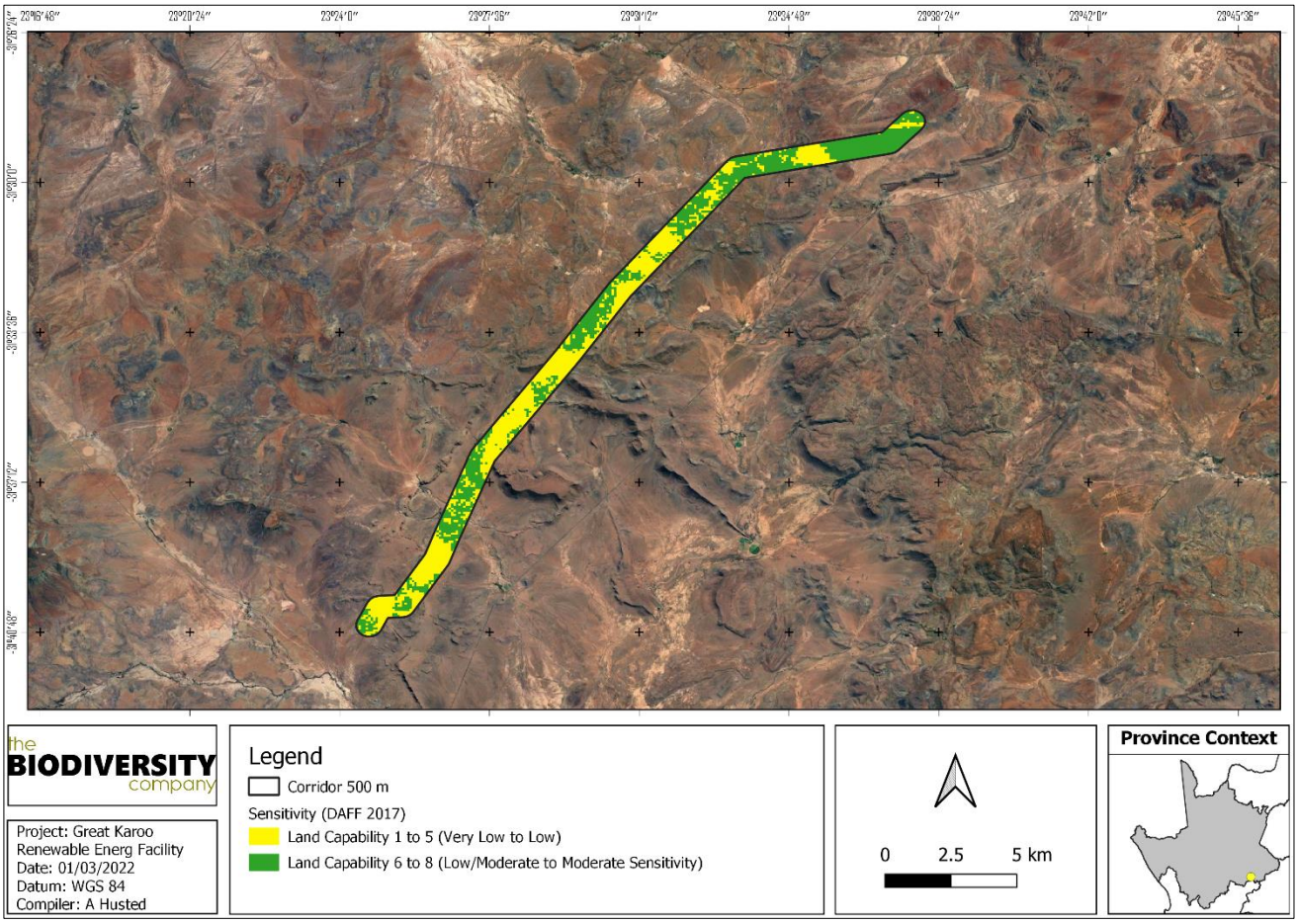


Figure 7.4: Land capability sensitivity of the grid connection corridor (DAFF, 2017)

7.6.2 Description Impacts on Land Use, Soils and Agricultural Potential

Construction Phase

During the construction phase, heavy vehicles (trucks) will be used to transport the pylons associated with the proposed powerline infrastructure. The pylons will be installed into the soil surface with a minor footprint area. A larger footprint area will however be disturbed by heavy vehicles during the construction phase whilst erecting pylons, which is expected to be associated with an extremely short duration. The development of the substation will require soil to be stripped and cleared for the footprint area, resulting in a loss of resources which will be continued into the operational phase of the project.

Operation Phase

During the operational phase, limited impacts are foreseen. Maintenance of vegetation as well as the occasional maintenance of powerline servitude will have to be carried out throughout the life of the project.

It is expected that these maintenance practices can be undertaken by means of manual labour while using existing roads. Overland flow dynamics are expected to be affected slightly in the event that erosion originates from the base of pylons and from the substation.

7.6.3 Impact tables summarising the significance of impacts on land use, soils and agricultural potential during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: Loss of land capability		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long Term (4)	Long Term (4)
Magnitude	Low (4)	Minor (2)
Probability	Improbable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks. » Proper invasive plant control must be undertaken quarterly. » All excess soil (soil that are stripped and stockpiled to make way for foundations) must be stored, and continuously rehabilitated to be used for rehabilitation of eroded areas. » All areas outside of the footprint areas that will be degraded (by means of vehicles, laydown yards etc.) must be ripped where compaction has taken place. Ripping tines must penetrate to just below the compacted horizons (approximately 300 – 400 mm) with soil moisture being imminent to the success of ripping. Ripping must take place within 1-3 days after seeding, and also following a rain event to ensure a higher moisture content.		
Residual Impacts: **Limited residual impacts will be associated with these activities, assuming that all prescribed mitigation measures be strictly adhered to.**		

Operation Phase Impacts

***Nature:* Loss of land capability**		
	Without mitigation	***With mitigation***
Extent	Low (2)	Low (2)
Duration	Long Term (4)	Long Term (4)
Magnitude	Low (4)	Minor (2)
Probability	Improbable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative

Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks. » Proper invasive plant control must be undertaken quarterly. » All areas outside of the footprint areas that will be degraded (by means of vehicles, laydown yards etc.) must be ripped where compaction has taken place. Ripping tines must penetrate to just below the compacted horizons (approximately 300 – 400 mm) with soil moisture being imminent to the success of ripping. Ripping must take place within 1-3 days after seeding, and also following a rain event to ensure a higher moisture content.		
Residual Impacts: **Limited residual impacts will be associated with these activities, assuming that all prescribed mitigation measures be strictly adhered to.**		

7.6.4 Overall Result

Low pre- and post-mitigation significance ratings are expected for the construction phase. During the operational phase, the pre-mitigation significance will be medium. This can be reduced to low significance through implementation of the recommended mitigation measures.

Considering the low sensitivities associated with land potential resources, it is the specialist's opinion that the proposed activities will have an acceptable impact on soil resources and that the proposed activities should proceed as have been planned.

7.7 Assessment of Impacts on Heritage (including Archaeology, Palaeontology and Cultural Landscape)

Potential impacts on heritage resources and the relative significance of the impacts associated with the development of the Great Karoo EGI are summarised below (refer to **Appendix H**).

7.7.1. Results of the Heritage Impact Assessment

Archaeology

A total of thirty (30) archaeological observations were identified along the grid alignment. None of the identified archaeological resources were determined to be conservation worthy. Six modern windmill and water storage structures were identified within the grid alignment options but none of these were determined to be conservation worthy.

Palaeontology

No palaeontological very high sensitivity / no-go areas have been identified within the grid connection corridor. With the exception of two fossil sites of low scientific value, none of the recorded fossil sites overlaps directly with, or lies close to (< 20 m), proposed infrastructure. While a number of fossil sites are recorded within the grid connection corridor, none is of conservation significance while most of the sites are already protected within standard ecological buffer zones along drainage lines.

Cultural Landscape

The landscape of the development area has been assessed for cultural heritage significance, and found to have five distinct character areas:

- Historic movement corridors.
- Open plains interrupted by low koppies.
- Elevated areas with steep sided mountain ridges.
- Areas of landscape that have been transformed by significant infrastructural development.
- Remote landscape with wilderness qualities.

Of the five distinct character areas identified in the Cultural Landscape Assessment (Winter, 2021), the proposed grid connection infrastructure falls within one character area, namely, 'areas of landscape that have been transformed by significant infrastructural development'.

7.7.2. Description of Heritage Impacts

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development. The main impacts expected to occur on the archaeological and palaeontological heritage associated with the development of the Great Karoo EGI will be during the construction phase. No major impacts are expected during the operation or decommissioning phase. Since the broader context of the area proposed for development has cultural significance, it may be impacted by the proposed development.

7.7.3. Impact tables summarising the significance of impacts on heritage during construction, operation and decommissioning (with and without mitigation)

Construction and Operation Phase Impacts

Archaeology

***Nature:* The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development**		
	Without mitigation	***With mitigation***
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor 2)	Minor (2)
Probability	Very improbable (1)	Very improbable (1)
Significance	**Low (8)**	**Low (8)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	N/A	
Mitigation:		

» Should any significant archaeological resources be uncovered during the course of the construction phase, work must cease in the area of the find and SAHRA must be contacted regarding an appropriate way forward.
Residual Impacts: **Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources**

Palaeontology

***Nature:* The area proposed for development is known to conserve heritage resources of palaeontological significance that may be impacted by the proposed development**		
	Without mitigation	***With mitigation***
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	High (8)
Probability	Definite (5)	Very improbable (1)
Significance	**High (70)**	**Low (14)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	Likely	Unlikely
Can impacts be mitigated?	Yes	

Mitigation:

» The Chance Fossil Finds Procedure must be implemented for the duration of construction activities:
- Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.
- Record key data while fossil remains are still in situ:
  - Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo.
  - Context – describe position of fossils within stratigraphy (rock layering), depth below surface.
  - Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering).
- If feasible to leave fossils in situ:
  - Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation.
  - Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume.
- If not feasible to leave fossils in situ (emergency procedure only):
  - Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock).
  - Photograph fossils against a plain, level background, with scale.
  - Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags.
  - Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist.
  - Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation.
- If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.

o Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency.
Residual Impacts: Should any significant palaeontological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources

Cultural Landscape

***Nature:* The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development**		
	Without mitigation	***With mitigation***
Extent	Regional (5)	Regional (5)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (26)**	**Low (26)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	N/A	
Mitigation: » Impacts cannot be mitigated.		
Residual Impacts: NA		

7.7.4. Overall Result

No archaeological resources of significance were identified within the grid connection corridor and as such, no impact to significant archaeological heritage is anticipated.

In terms of impacts to palaeontological resources, the area proposed for development underline but sediments of very sensitive for impacts to significant palaeontological heritage. While the site visit conducted did not identify significant fossil material, the likelihood of uncovering significant palaeontology that is preserved below the ground surface remains high.

In terms of impacts to the cultural landscape, the proposed development is broadly located in an area with a culturally significant sense of place. That being said, the grid connection corridor follows a route of existing infrastructure. The impact to the cultural landscape of the additional infrastructure is acceptable, as it makes little material difference to the already disturbed landscape.

It is not anticipated that the proposed development of the grid connection infrastructure will negatively impact on significant heritage resources. The following recommendations are made:

- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g., remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.

7.8 Assessment of Visual Impacts

Negative impacts on visual receptors will occur during the undertaking of construction activities and the operation of the Great Karoo EGI. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I** for more details).

7.8.1. Results of the Visual Impact Assessment

Visual distance / observer proximity to the grid connection infrastructure

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger grid connection infrastructure (e.g., 400kV) and downwards for smaller structures (e.g., 132kV) due to variations in height. This methodology was developed in the absence of any known and/or accepted standards for South African power line infrastructure.

The proximity radii (calculated from the grid connection infrastructure) are indicated in **Figure 7.5**, and include the following:

- 0 – 0.5km - Short distance view where the structures would dominate the frame of vision and constitute a very high visual prominence.
- 0.5 – 1.5km - Medium distance views where the structures would be easily and comfortably visible and constitute a high visual prominence.
- 1.5 - 3km - Medium to longer distance view where the structures would become part of the visual environment but would still be visible and recognisable. This zone constitutes a medium visual prominence.
- Greater than 3km - Long distance view where the structures may still be visible though not as easily recognisable. This zone constitutes a low visual prominence for the power lines.

Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed grid connection infrastructure culminate in a visual impact index.

The index indicates that potential sensitive visual receptors within a 500m radius of the project infrastructure may experience visual impacts of a very high magnitude. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; high within a 0.5 – 1.5km radius (where/if sensitive receptors

are present) and moderate within a 1.5 – 3km radius (where/if sensitive receptors are present). Receptors beyond 3km are expected to have visual impacts of low or negligible magnitude.

The visual impact index and potentially affected sensitive visual receptors are indicated in **Figure 7.6**. In general, there are only a limited number of receptor sites within closer proximity (3km) to the proposed project infrastructure, namely:

- A section of the Hutchinson secondary road
- The Kleinfontein homestead
- A section of the R63 arterial road
- The Burgersfontein homestead
- The Poortjie homestead

Magnitude of the potential visual impact

0 – 0.5km and 0.5 – 1.5km

The majority of the exposed areas in this zone fall within vacant open space, generally devoid of observers or potential sensitive visual receptors. Sections of the Hutchinson secondary road may experience visual impacts of high to very high magnitude.

1.5 – 3km

There are four potential sensitive receptor sites within this zone, namely observers residing at the Kleinfontein, Burgersfontein and Poortjie homesteads, and a section of the R63 arterial road traversing south-west of the Gamma Substation. The magnitude of the visual impact is expected to be moderate.

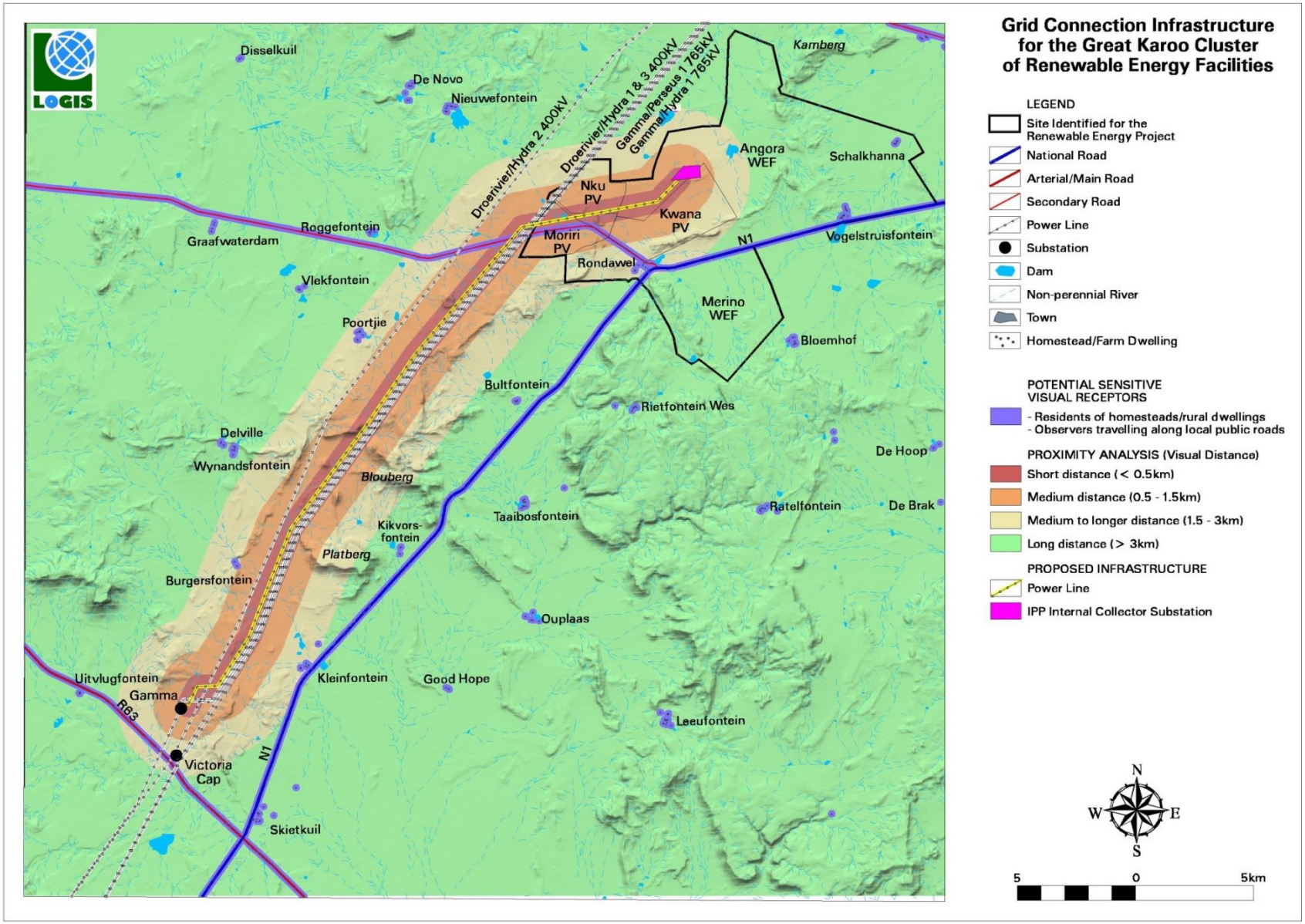


Figure 7.5: Proximity analysis and potential sensitive visual receptors

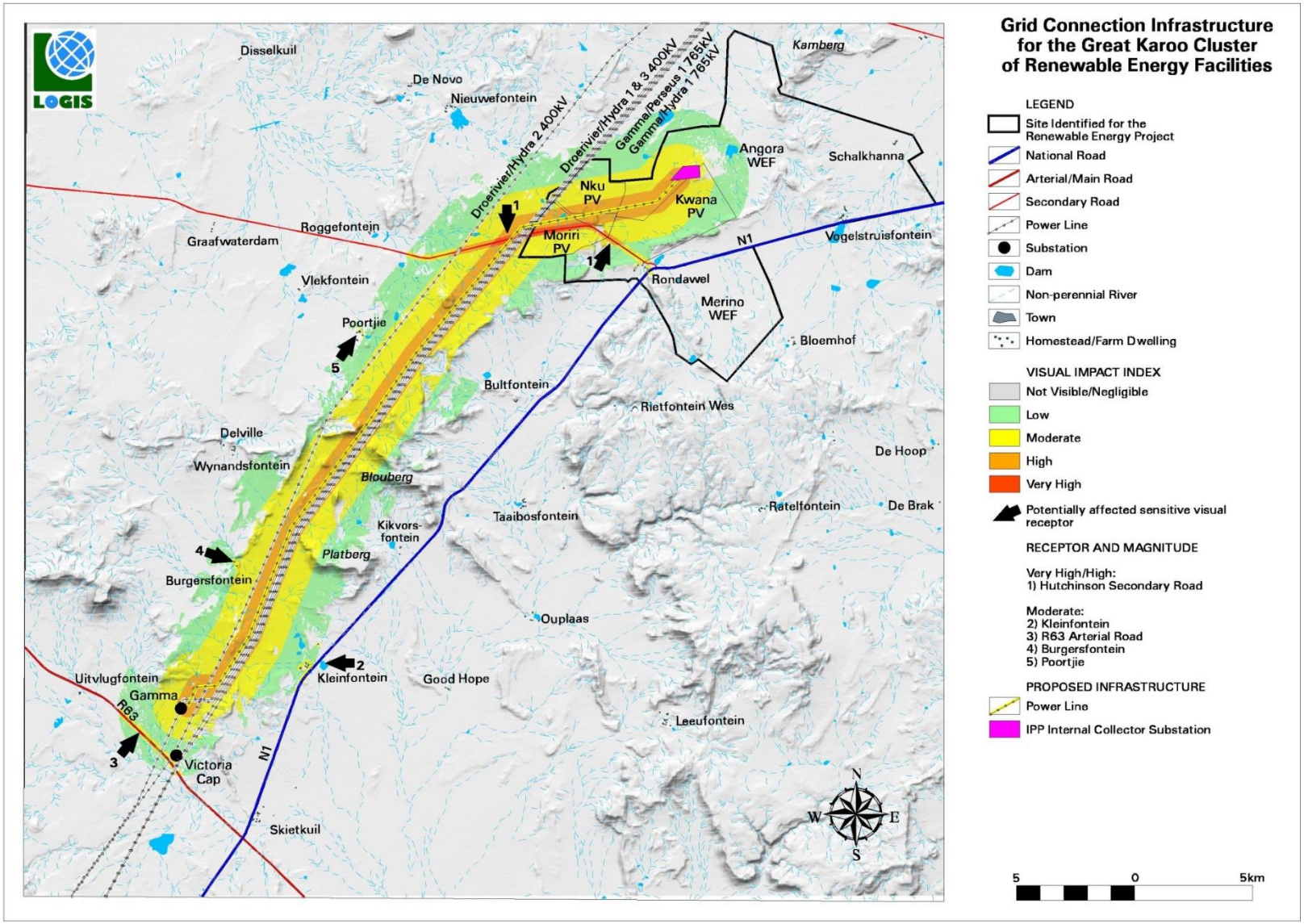


Figure 7.6: Visual impact index and potentially affected sensitive visual receptors

7.8.2. Description of Visual Impacts

The following impacts have been identified and assessed as part of the visual impact assessment:

» ***Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed 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.

» ***Potential visual impact on sensitive visual receptors located within a 1.5km radius of the grid connection infrastructure during the operation phase:*** The grid connection infrastructure is expected to have a low visual impact on observers within 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.

» ***Potential visual impact on sensitive visual receptors within the region (1.5 – 3km radius) during the operation of the grid connection infrastructure:*** The grid connection infrastructure will have a low visual impact on observers traveling along the roads and residents of homesteads within a 1.5 - 3km radius of the infrastructure.

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

7.8.3. Impact tables summarising the significance of visual impacts during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)

Probability	Improbable (2)	Improbable (2)
Significance	**Low (20)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	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.

Operation Phase Impacts

Nature: 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	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (28)**	**Low (28)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	

Mitigation / Management:

Planning:

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

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.

Nature: 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	Regional (3)	Regional (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, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	

Mitigation / Management:

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.

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.

Nature: 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	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (18)**	**Low (18)**
Status (positive, neutral 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	

Generic best practise mitigation/management measures:

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.

Residual impacts:

The visual impact will be removed after decommissioning, provided the grid connection infrastructure is removed. Failing this, the visual impact will remain.

7.8.4. Overall Result

The findings of the Visual Impact Assessment undertaken for the proposed grid connection infrastructure for the Great Karoo Cluster of Renewable Energy Facilities indicate that the visual environment surrounding the power line and substation, especially within a 1.5km radius, may be visually impacted upon for the anticipated operational lifespan of the grid connection infrastructure.

This impact is applicable to the proposed grid connection infrastructure and to the potential cumulative visual impact of the infrastructure in association with existing power line infrastructure (and future power generation infrastructure) within the region.

The anticipated that visual impacts listed associated with the construction and operation of the proposed grid connection infrastructure (i.e., post mitigation impacts) will range from moderate to low significance. No visual impacts of a high significance are expected to occur. Anticipated visual impacts on sensitive visual receptors in close proximity to the power line are not considered to be fatal flaws for the proposed project.

Considering all factors, it is recommended that the development of the grid connection infrastructure as proposed be supported subject to the implementation of the recommended mitigation measures.

7.9 Assessment of Socio-economic Impacts

Potential social impacts, and the relative significance of the impacts associated with the development of the Great Karoo EGI are summarised below (refer to **Appendix J** for more details)

7.9.1. Results of the Socio-economic Impact Assessment

The development of renewable energy and the associated energy infrastructure is strongly supported at a national, provincial, and local level. The development of and investment in renewable energy and associated energy distribution infrastructure is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all highlight the importance of energy security and investment in energy infrastructure. The proposed grid connection infrastructure is also located within the Central Transmission Corridor. The area has therefore been identified as suitable for the establishment of grid infrastructure. The development of the proposed Great Karoo EGI is therefore supported by key policy and planning documents.

7.9.2. Description of Socio-economic Impacts

Impacts are expected to occur with the development of the Great Karoo EGI during the construction, operation and decommissioning phases. Both positive and negative impacts are identified and assessed.

Positive impacts during construction include:

» Creation of employment and business opportunities, and the opportunity for skills development and on-site training.

Negative impacts during construction include:

» Impacts associated with the presence of construction workers on local communities.
» Noise, dust, and safety impacts of construction related activities and vehicles.

» Risk of veld fires.
» Risks posed to farming activities by construction workers.

Positive impacts during operation include:
» Improved energy security and establishment of energy infrastructure.
» Creation of employment, skills development, and local procurement opportunities.
» Generate income for landowners.

Negative impacts during operation include:
» The visual impacts and associated impact on sense of place.
» Risks posed to farming activities by maintenance workers.

Social impacts during the decommissioning phase are expected to be similar to those that take place during the construction phase.

7.9.3. Impact tables summarising the significance of social impacts during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Positive Impacts During Construction

Nature: Creation of employment and business opportunities during the construction phase		
	Without Enhancement	**With Enhancement**
Extent	Local – Regional (2)	Local – Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Highly probable (4)
Significance	**Low (24)**	**Medium (44)**
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	
Enhancement: **Employment** » Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area. » Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. » Before the construction phase commences the proponent should meet with representatives from the ULM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase. » The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for		

locals and the employment procedures that the proponent intends following for the construction phase of the project.

» Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.

» The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business

» The proponent should liaise with the ULM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work.

Residual impacts:
Improved pool of skills and experience in the local area.

Negative Impacts During Construction

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (15)**
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	

Mitigation:

» Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories.

» The proponent and the contractor(s) should develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation.

» The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.

» The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site.

» The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.

» No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.
Residual impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

Nature: Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (24)**
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	Yes

Mitigation:

» A Stakeholder Engagement Plan (SEP) should be prepared prior to the commencement of the construction phase. The SEP should outline the approach to engaging with affected farmers and landowners and addressing concerns and grievances.
» An Environmental Control Officer (ECO) should be appointed to monitor the construction phase. The Environmental Control Officer (ECO) should conduct regular inspections (daily or weekly) of affected farms to ensure farm gates are closed and damage to fences is addressed timeously.
» The proponent should enter into an agreement with local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
» Traffic movement and construction related activities should be contained within clearly designated areas.
» Strict traffic speed limits must be enforced.
» All farm gates must be closed after passing through.
» Contractors appointed by the proponent should provide daily transport for construction workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties.
» Ongoing consultation with stakeholders must be undertaken throughout the construction phase.
» The proponent should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction related activities and or workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below).

» The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested. » Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. » Contractors appointed by the proponent must ensure that construction workers found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. » No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.
Residual impacts: No, provided losses are compensated for.

Nature: Potential noise, dust and safety impacts associated with construction related activities		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Short Term (2)	Short Term (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (15)**
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: » Ongoing consultation with stakeholders must be undertaken throughout the construction phase. » Ongoing communication with landowners and road users during the construction period. » Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. » Implementation of a road maintenance programme throughout the construction phase to ensure that the affected roads are maintained in a good condition and repaired once the construction phase is completed. » Repair of all affected road portions at the end of construction period where required. » Dust suppression measures must be implemented on un-surfaced roads, such as wetting on a regular basis and ensuring that vehicles used to transport building materials are fitted with tarpaulins or covers. » All vehicles must be roadworthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.		
Residual impacts: If damage to local farm roads is not repaired, then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage.		

Nature: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires		
	Without Mitigation	**With Mitigation**
Extent	Local (4)	Local (2)
Duration	Short term (2)	short term (2)
Magnitude	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock and crop losses etc.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

» The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
» Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas.
» Smoking on site should be confined to designated areas.
» Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy winter months.
» Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle.
» Contractor should provide fire-fighting training to selected construction staff.
» No construction staff, with the exception of security staff, to be accommodated on site overnight.
» As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.

Residual impacts:
No, provided losses are compensated for.

Operational Phase Impacts

Positive Impacts During Operations

Nature: Development of infrastructure to improve energy security and support renewable sector		
	Without Enhancement	**With Enhancement**
Extent	Local, Regional and National (3)	Local, Regional and National (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)

Probability	Highly Probable (4)	Definite (5)
Significance	**Medium (52)**	**High (65)**
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	Reduced CO_2 emissions and impact on climate change
Can impact be enhanced?	Yes	

Enhancement:

» Maximise the number of employment opportunities for local community members.
» Implement training and skills development programs for members from the local community.
» Maximise opportunities for local content and procurement.

Residual impacts:
Overall reduction in CO_2 emission, reduction in water consumption for energy generation, contribution to establishing an economically viable commercial renewables generation sector in the Northern Cape and South Africa.

Nature: Creation of employment and business opportunities associated with the operational phase

	Without Enhancement	**With Enhancement**
Extent	Local and Regional (1)	Local and Regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Low (28)**	**Medium (40)**
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	

Enhancement:
Employment

» Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
» Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.
» Before the construction phase commences the proponent should meet with representatives from the ULM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase.
» The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.

» Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. » The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. **Business** » The proponent should liaise with the ULM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work.
Residual impacts: Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area

Nature: The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc.		
	Without Enhancement	**With Enhancement**
Extent	Local (1)	Local (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Significance	**Low (27)**	**High (65)**
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
Enhancement: » Implement agreements with affected landowners.		
Residual impacts: Support for local agricultural sector and farming		

Negative Impacts During Operations

Nature: Visual impact associated with the grid connection infrastructure and the potential impact on the areas rural sense of place.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (40)**	**Medium (36)**

Status	Negative	Negative
Reversibility	Yes, grid infrastructure components can be removed.	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Mitigation: » The recommendations contained in the VIA should be implemented.		
Residual impacts: Potential impact on current rural sense of place		

Nature: Potential risk to safety to farming operations and livestock associated with the presence of maintenance workers on the site		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Medium (3)	Low (2)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Low (28)**	**Low (24)**
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Mitigation: » Affected property owners should be notified in advance of the timing and duration of maintenance activities. » Maintenance teams must ensure that all farm gates must be closed after passing through. » Property owners should be compensated for damage to farm property and or loss of livestock or game associated maintenance related activities. » Movement of traffic and maintenance related activities should be strictly contained within designated areas associated with transmission lines and substations. » Strict traffic speed limits must be enforced on the farm. » No maintenance workers should be allowed to stay over-night on the affected properties.		
Residual impacts: No, provided losses are compensated for.		

7.9.4. Overall Result

The energy security benefits associated with the proposed Great Karoo Renewable Energy Cluster are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. The findings of the SIA indicate that the significance of the potential negative social impacts for both the construction and operational phase of the proposed grid connection are Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended

mitigation measures are implemented. The alignment was also regarded as acceptable by affected landowners interviewed.

The power line is also located within the Central Transmission Corridor. The establishment of proposed Great Karoo Electrical Grid Infrastructure (EGI) is therefore supported by the findings of the SIA.

7.10 Assessment of Cumulative Impacts

The Great Karoo EGI may have effects (positive and negative) on natural resources, the social environment and on the people living in the project area. The preceding impact assessment sections have reported on the assessment of impacts associated with the Great Karoo EGI largely in isolation (from other similar developments).

This section assesses the potential for the impacts associated with the project to become more significant when considered in combination with other known or proposed electrical grid infrastructure within the area.

This assessment is based on information currently available and considers impacts from similar developments within the area. The following potential impacts are considered:

- Cumulative impacts on terrestrial ecology.
- Cumulative impacts on aquatic ecology
- Cumulative impacts on avifauna
- Cumulative impacts on land use, soils and agricultural potential
- Cumulative impacts on heritage resources
- Cumulative visual impacts
- Cumulative social impacts

Figure 7.7 indicates the location of the Great Karoo EGI in relation to all other operating and proposed grid connection infrastructure and renewable energy facilities located within the surrounding area of the project site.

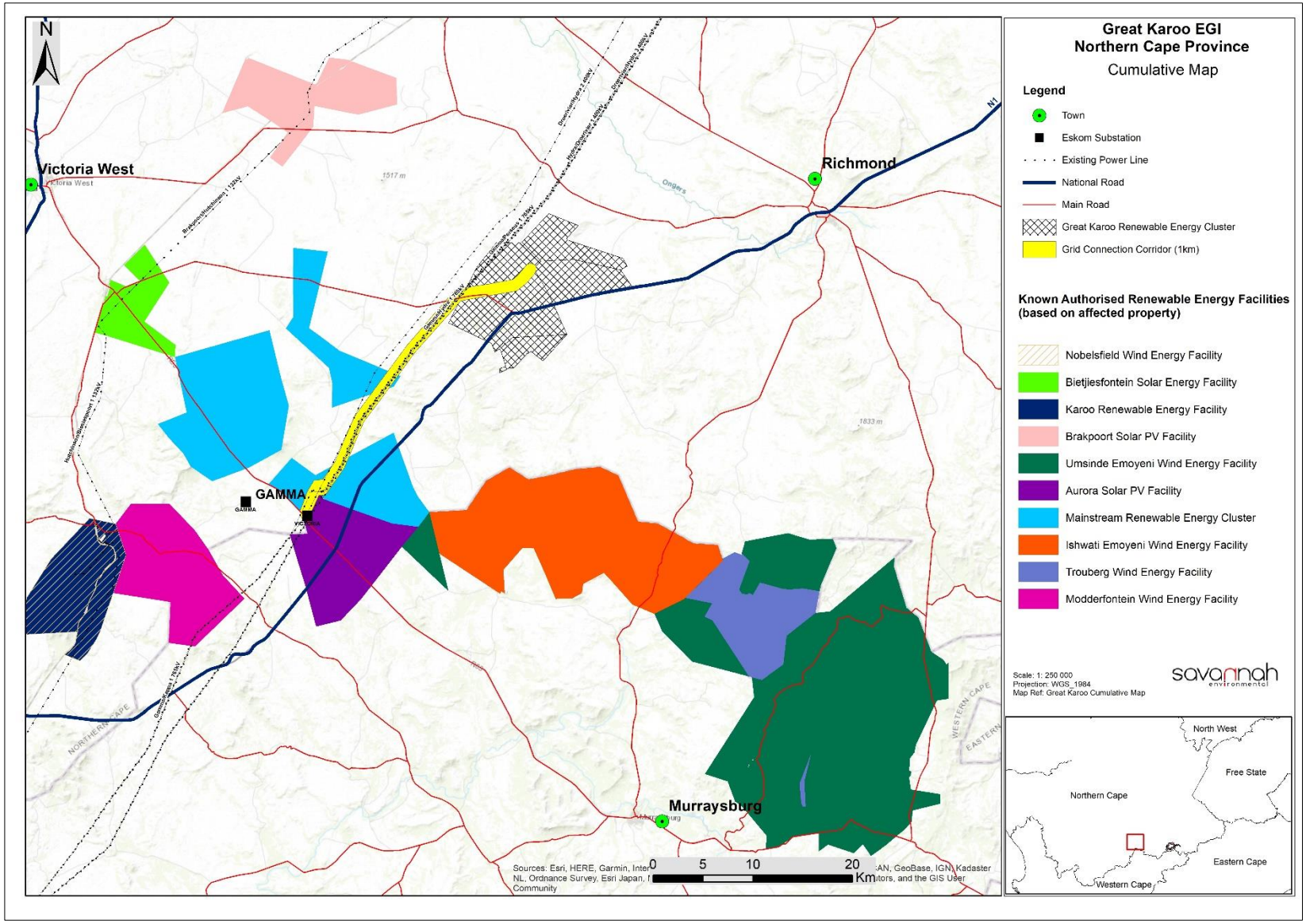


Figure 7.7: Cumulative map illustrating grid connection infrastructure and other approved and/or constructed renewable energy facilities located within a 30km radius of the Great Karoo EGI

7.10.1. Cumulative Impact on Terrestrial Ecology

Nature: Loss and/or fragmentation of indigenous natural vegetation due to clearing		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site (1)	Local (2)
Duration	Long term (4)	Permanent (5)
Magnitude	Minor (2)	Low (4)
Probability	Definite (5)	Definite (5)
Significance	**Medium (35)**	**Medium (55)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	No
Confidence in findings: High.		
Mitigation: » Restrict impact to development footprint only and limit disturbance creeping into surrounding areas. » As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores. » Avoid sensitive features and habitats when locating infrastructure. » Compile a Rehabilitation Plan. » Compile an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. » Where possible, access roads should be located along existing farm and district roads. » Access to sensitive areas should be limited during construction. » Undertake monitoring to evaluate whether further measures would be required to manage impacts. » Footprints of infrastructure, laydown areas, construction sites, roads and substation sites should be clearly demarcated. » No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities, unless for maintenance purposes, in which case all reasonable steps should be taken to limit damage to natural areas. » No driving of vehicles off-road outside of construction areas. » Limit clearing of natural habitat designated as sensitive, especially rocky outcrops, cliffs and riparian habitats, where possible. » Personnel and vehicles should be restricted to acess roads and no off-road driving should occur.		

Nature: Impact on integrity of CBAs		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Province (4)	Province (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Small (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		

Mitigation:

» Choose alternatives outside of CBA1 areas.
» Place tower structures as far as possible away from the point of origin of the drainage line that constitutes the core of the CBA1 area (this point is approximately at 31o31'36.1"S, 23o31'28"E).
» Locate linear infrastructure outside boundaries of CBA1 areas, except where these are located entirely within existing disturbance and/or transformation.

Nature: Establishment and spread of alien invasive plants over wide areas		
	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	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (48)**	**Medium (48)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		

Mitigation:

» Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.
» Undertake regular monitoring to detect alien invasions early so that they can be controlled.
» Implement control measures for declared weeds and alien invader plants.

Nature: Increased runoff and erosion		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site (1)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	Partly reversible	Partly reversible
Irreplaceable loss of resources?	Yes, but limited	Yes, but limited
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		

Mitigation:

» Compile and implement a stormwater management plan.
» Keep gradients of roads adequately low to minimise erosion.
» Align roads to avoid steep slopes and avoid the necessity for significant cuts and fills.
» Monitor road surfaces for erosion and repair or upgrade, where necessary.
» Install additional flood and/or erosion control measures, where necessary.
» Undertake effective rehabilitation of disturbed areas.

Nature: Cumulative impacts on SCC from construction clearing due to a number of projects		
	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)	Permanent (5)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Highly probable (4)
Significance	**Medium (45)**	**Medium (60)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: » A detailed pre-construction walk-through survey will be required during a favourable season to locate any individuals of protected plants, as well as for any populations of threatened plant species. This survey must cover the footprint of all approved infrastructure, including internal service roads and footprints of tower structures (final infrastructure layout). The best season is early to late Summer, but dependent on recent rainfall and vegetation growth. » Where significant populations of SCC are found, shift infrastructure to avoid direct impacts. » Compile a Plant Rescue Plan to be approved by the appropriate authorities. » Undertake monitoring to evaluate whether further measures would be required to manage impacts. » Obtain the necessary permits for specimens or protected plant species that will be lost due to construction of the project. » For any plants that are transplanted, annual monitoring should take place to assess survival. This should be undertaken for a period of three years after translocation and be undertaken by a qualified botanist. The monitoring programme must be designed prior to translocation of plants and should include control sites (areas not disturbed by the project) to evaluate mortality relative to wild populations. » No collecting or poaching of any plant species must be permitted on site. » Loss of protected species of conservation concern must be report to the conservation authorities. » Personnel must be educated about protection status of species, including distinguishing features, to be able to identify protected species. » Implement strict access control for the site. » Report any illegal collection to conservation authorities.		

7.10.2. Cumulative Impact on Aquatic Ecology

Nature: Contamination Potential for increased contaminants entering the watercourse		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and the proposed projects in the area**
Extent	Local (2)	Regional (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	High (8)
Probability	Improbable (2)	Probable (3)
Significance	**Low (24)**	**Medium (51)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low

Nature: Contamination Potential for increased contaminants entering the watercourse		
Irreplaceable loss of resources?	*Yes*	*Yes*
Can impacts be mitigated?	Yes	Yes
Mitigation: » The contractors used should have spill kits available to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly. » All chemicals and toxicants to be used for the construction must be stored in a bunded area. » All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site at designed areas. » All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping"; » Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation). » All waste generated on site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.		

7.10.3. Cumulative Impact on Avifauna

The proposed Great Karoo EGI equates to a maximum of 37.5km. An intensive internet search was conducted to source information on the grid connections of the abovementioned projects available within the public domain, but in a few instances no information could be obtained. However, based on the information that could be sourced, it is estimated that the proposed grid connections for the approved renewable energy projects come to at least ~100km of high voltage lines. There are approximately 403kms of existing high voltage lines within the 30km radius around the Great Karoo EGI project (counting parallel lines as one). The Great Karoo EGI project will thus increase the total number of existing and planned high voltage lines by ~7 %. The contribution of the proposed Great Karoo EGI 132kV double circuit power line to the cumulative impact of all the high voltage lines is thus low. However, the combined cumulative impact of the existing and proposed power lines on avifauna within a 30km radius is considered to be moderate.
The cumulative impact of displacement due to disturbance and habitat transformation at the 132kV central collector substation associated with the Great Karoo EGI project is considered to be low, due to the small size of the footprint (0.7km2) and the availability of similar habitat within the 30km radius area. The cumulative impact of potential electrocutions within the central collector substation yard is also likely to be low as it is expected to be a rare event.

The tables below summarise the post-mitigation cumulative impacts associated with the proposed development.

Nature: *Displacement of priority avifauna due to disturbance due to the construction of the 132kV double circuit power line and central collector substation*		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Regional (3)
Duration	Very short (1)	Short-term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Improbable (2)	Highly probable (4)

Significance	**Low (14)**	**Medium (44)**
Reversibility	Negative	Negative
Status (positive or negative)	High	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» Conduct a pre-construction inspection (avifaunal walk-through) of the final central collector substation layout and power line alignment to identify priority species that may be breeding within the substation and to record the status of the eagle nests on the existing transmission power lines. If a nest is occupied, the avifaunal specialist must consult with the contractor to find ways of minimising the potential disturbance to the breeding pair of eagles during the construction period. This could include measures such as delaying some of the activities until after the breeding season.
» Construction activity should be restricted to the immediate footprint of the infrastructure.
» Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species.
» Measures to control noise and dust should be applied according to current best practice in the industry.
» Maximum used should be made of existing access roads and the construction of new roads should be kept to a minimum.

Nature: *Displacement of priority avifauna due to habitat transformation due to the construction of the 132kV double circuit power line and central collector substation*

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site (1)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (14)**	**Medium (44)**
Reversibility	Negative	Negative
Status (positive or negative)	High	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, but only to some extent	

Mitigation:

» Vegetation clearance should be limited to what is absolutely necessary.
» The mitigation measures proposed by the biodiversity specialist must be strictly enforced.

Nature: *Collision mortality of priority avifauna due to the construction of the 132kV double circuit power line*

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Improbable (2)	Probable (3)
Significance	**Low (20)**	**Medium (39)**
Reversibility	Negative	Negative
Status (positive or negative)	High	High
Irreplaceable loss of resources?	Yes	Yes

Can impacts be mitigated?	Yes

Mitigation:

» The avifaunal specialist must conduct a walk-through prior to implementation to demarcate sections of power line that need to be marked with Eskom approved bird flight diverters. The bird flight diverters should be installed on the full span length on the earthwire (according to Eskom guidelines - five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively. These devices must be installed as soon as the conductors are strung.

Nature: *Electrocution of priority avifauna due to the construction of the central collector substation*		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (16)**	**Low (22)**
Reversibility	Negative	Negative
Status (positive or negative)	High	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» The hardware within the proposed central collector substation yard is too complex to warrant any mitigation for electrocution at this stage. It is recommended that if on-going impacts are recorded once operational, site-specific mitigation (insulation) be applied reactively. This is an acceptable approach because Red List priority species are unlikely to frequent the switching station and substation and be electrocuted.

Nature: *Electrocution of priority avifauna due to the construction of the 132kV double circuit power line*		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (20)**	**Low (26)**
Reversibility	Negative	Negative
Status (positive or negative)	High	High
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» Construction of the power line using an approved bird friendly pole/tower design accordance with the Distribution Technical Bulletin relating to bird friendly structures. The final powerline design must be signed off by the avifaunal specialist.

7.10.4. Cumulative Impact on Land Use, Soils and Agricultural Potential

Cumulative impacts within the proposed powerline servitude and its surroundings have been determined to be low. Soil resources in the area have been affected to some degree by means of erosion, although to a lesser degree. Furthermore, no agricultural segregation has taken place in recent history by means of any development.

Nature: Loss of land capability		
	Overall impact of the proposed project considered in isolation (post mitigation)	**Cumulative impact of the project and other projects in the area (post mitigation)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (18)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks. » Proper invasive plant control must be undertaken quarterly. » All excess soil (soil that are stripped and stockpiled to make way for foundations) must be stored, continuously rehabilitated to be used for rehabilitation of eroded areas. » Rip all compacted areas outside of the developed areas that have been compacted. This must be done by means of a commercial ripper that has at least two rows of tines. Ripping must take place between 1 and 3 days after seeding and following a rainfall event (seeding must therefore be carried out directly after a rainfall event).		

7.10.5. Cumulative Heritage Impact

At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. Although this project falls outside of a REDZ area, it is noted that it is preferable to have renewable energy facility development clustered in an area such as a REDZ.

To address concerns about the cumulative impact of renewable energy facilities within the greater Karoo region, a cautious approach is required in terms of assessing the desirability of such development from a cultural landscape perspective. The proposed site is located adjacent to an existing infrastructural corridor associated with the national grid, which suggests a level of suitability of renewable energy facilities which can link in with the grid. Notwithstanding the existing infrastructure, the placement of renewable energy facilities, both PV and wind turbines, must take cognisance of the very high visual impact on a relatively intact and representative cultural landscape, and the extremely limited ability to visually screen this infrastructural development, particularly in the case of the wind turbines.

However, as this Heritage Impact Assessment is concerned with the grid connection infrastructure, the placement of the proposed grid corridor adjacent to existing grid connection infrastructure goes some way to mitigate the negative impact of the development on heritage resources.

Nature: Cumulative Impact to the sense of place		
	Overall impact of the proposed project considered in isolation (post mitigation)	**Cumulative impact of the project and other projects in the area (post mitigation)**
Extent	Site (1)	Site (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	N/A
Mitigation: » No impacts are anticipated and as such, no mitigation is required.		

7.10.6. Cumulative Visual Impact

Nature of Impact: The potential cumulative visual impact of the grid connection infrastructure on the visual quality of the landscape.		
	Overall impact of the project considered in isolation (with mitigation)	**Cumulative impact of the project and other projects within the area (with mitigation)**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Improbable (2)	Probable (3)
Significance	Low **(28)**	Moderate **(42)**
Status (positive, neutral 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	
Generic best practise mitigation/management measures: <u>Planning:</u> » Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. <u>Operations:</u> » Maintain the general appearance of the servitude as a whole. <u>Decommissioning:</u> » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		

7.10.7. Cumulative Social Impact

The study area is traversed by several existing Eskom transmission lines associated with the Gamma substation. The potential for cumulative impacts associated with the combined visibility (whether two or more power lines will be visible from one location) and sequential visibility (e.g., the effect of seeing two or more power lines along a single journey, e.g., road or walking trail) does therefore exist. However, the cumulative impact on the areas sense of place is likely to be low. None of the affected property owners

interviewed identified visual impacts as a concern. The area also falls within the Central Transmission Corridor. The area has therefore been identified as suitable for the establishment of the grid infrastructure.

Nature: Visual impacts associated with the establishment of associated grid infrastructure and the potential impact on the area's rural sense of place and character 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 (1)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (36)**	**Medium (40)**
Status (positive/negative)	Negative	Negative
Reversibility	Yes, grid infrastructure components can be removed.	
Loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Mitigation: » The recommendations contained in the VIA should be implemented.		

7.10.8 Conclusion regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development of the Great Karoo EGI 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 Great Karoo EGI is to test 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.

The following conclusions can be drawn regarding the cumulative impacts associated with the project:

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes) due to the development of the Great Karoo EGI and other grid connection infrastructure within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no significant loss of sensitive and significant aquatic features. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of the Great Karoo EGI and other grid connection infrastructure within the surrounding area, provided the recommended mitigation measures are implemented. This is due to the limited footprint expected to be associated with grid connection infrastructure in the area. The cumulative impact is therefore acceptable.
- There will be no unacceptable loss of land capability due to the development of the Great Karoo EGI and other grid connection infrastructure within the surrounding areas, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- The construction of the grid connection infrastructure for the Great Karoo Cluster of Renewable Energy Facilities may increase the cumulative visual impact of industrial type infrastructure within the region. However, the change is not considered to be a fatal flaw.

- There will be no unacceptable loss of heritage resources associated with the development of the Great Karoo EGI. There will also be no unacceptable impacts to the cultural landscape as a result of the development of the grid connection infrastructure. The cumulative impact is therefore acceptable.
- No unacceptable social impacts are expected to occur.

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

Table 7.1: Summary of the cumulative impact significance for the Great Karoo EGI

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	Medium	Medium
Aquatic Ecology	Low	Medium
Avifauna	Low Low Low Low Low	Medium Medium Medium Low Low
Land use, soil and agricultural potential	Low	Low
Heritage (including archaeology, palaeontology and sense of place)	Low	Low
Visual	Low	Medium
Social	*Negative impacts:* Medium	*Negative impacts:* Medium

Based on the specialist cumulative assessment and findings, the development of the Great Karoo and its contribution to the overall impact of all grid connection infrastructure within the broader area, it can be concluded that the Great Karoo cumulative impacts will be of a medium to low significance. Therefore, the development of the Great Karoo EGI will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

7.11 Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e., 'no-go' alternative) is the option of not constructing the Great Karoo EGI. This means that the status quo of the environment would remain unchanged and no additional impacts would occur. The implementation of the 'do-nothing' alternative will however result in essential infrastructure (i.e., the Great Karoo EGI) to cater for the Great Karoo Cluster of Renewable Energy Facilities not being established and will, therefore, render the development of the renewable energy facilities and the operation thereof not technically feasible as the facilities would not be able to connect to the national grid. This will result in the loss of the opportunity to develop the various renewable energy facilities, which could have impacts at a national scale.

In addition, the Northern Cape Province will not benefit from additional generated power from a renewable source being evacuated through the proposed grid infrastructure directly into the province's grid. There will also be a potential loss for development of renewable energy which is detailed in the local, regional and national policies (Chapter 3) to be of great importance for economic development. Therefore, from a

regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

This would result in negative impacts at a local, regional and national scale from a socio-economic and economic perspective and is not considered desirable. The negative impacts of 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 to be implemented for the development of the Great Karoo EGI.

CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS

Great Karoo Renewable Energy (Pty) Ltd is proposing the development of a 132kV collector substation, 132kV power line and associated infrastructure which will enable the evacuation of electricity from the Great Karoo Cluster of Renewable Energy Facilities. The project site is located approximately 35km south-west of Richmond and 80km south-east of Victoria West, within the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province, with the entire extent of the site located within the Central Corridor of the Strategic Transmission Corridors. A portion (approximately 2km) of the grid corridor falls within the Beaufort West Local Municipality of the Central Karoo District in the Western Cape Province.

A preferred project site has been identified by Great Karoo Renewable Energy (Pty) Ltd as a technically suitable area for the development of the Great Karoo EGI. The central collector substation, which comprises both an Eskom portion and an IPP portion, is proposed on Portions 0 and 1 of the Farm Rondavel 85. The following affected properties are traversed by the grid corridor:

- Portion 0 of Farm Annex Rondavel 86;
- Portion 1of Farm Uit Vlugt Fontein 265;
- Portion 0 of Farm Wynandsfontein 91;
- Portion 1 of Farm Wynandsfontein 91;
- Portion 3 of Farm Vlekfontein 90;
- Portion 0 of Farm Burgersfontein 92;
- Portion 0 of Farm Nieuwe Fontein 89;
- Portion 1 of Farm Nieuwe Fontein 89;
- Portion 0 of Farm Rondavel 85;
- Portion 1 of Farm Rondavel 85;
- Portion 0 of Farm Kleinfontein 93;
- Portion 1 of Farm Bult & Rietfontein 96; and
- Remaining Extent of Farm Schietkuil 3.

A development footprint of 19.95ha for the placement of the132kV central collector substation has been identified within the project site and assessed as part of the BA process. One grid corridor of up to 1km in width and 37.5km in length has been identified for the placement of the proposed 132kV double circuit power line and is assessed as part of this BA process. During construction, a permanent access road along the length of the power line corridor between 4 - 6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation. Additional infrastructure associated with the Great Karoo EGI will include equipment, infrastructure, buildings, and temporary and permanent laydown areas

A summary of the recommendations and conclusions for the proposed project 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 the Basic Assessment Report:

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 supporting infrastructure establishment 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 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.	An environmental impact statement containing the key findings of the environmental impacts has been included as **section 8.5.** Sensitive environmental features located within the grid corridor and substation development footprint are shown in **Figure 8.1**. A summary of the positive and negative impacts associated with the Great Karoo EGI has been included in **section 8.2.**
h (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	A concluding statement indicating the preferred alternatives and the preferred location of the activity is included in **section 8.5 and 8.6.**
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 of the Great Karoo EGI 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 Great Karoo EGI should be authorised has been included in **section 8.6.**

8.2. Evaluation of the Great Karoo EGI

The preceding chapters of this BA Report, together with the specialist studies contained within **Appendices D-J** provide a detailed assessment of the potential impacts that may result from the development of the Great Karoo EGI Aand associated infrastructure. This chapter concludes the environmental assessment of the project 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 Environmental Assessment Practitioner (EAP) and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws or unacceptable impacts were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the grid corridor, and strict management of potential sources of pollution (e.g., litter, hydrocarbons from vehicles & machinery, cement during construction, etc.) within demarcated/bunded areas.

Impacts identified to be associated with the proposed project and assessed within this report include:

- Impacts on terrestrial ecology.
- Impacts on aquatic ecology.
- Impacts on avifauna.
- Impacts on heritage resources, including palaeontology.

» Impacts on land use, soils and agricultural potential.
» Visual impacts.
» Impacts on the social environment. .

8.2.1 Impacts on Ecology (including Flora and Fauna)

The study area consists mostly of natural habitat that is used for commercial animal husbandry. There are existing transmission power lines running across the site with associated access tracks as well infrastructure associated with a farmstead (Rondavel), but no other infrastructure on site. Existing impacts on natural habitat are related to grazing effects and erosion in lowland areas. The proposal to build grid connection infrastructure will therefore have some effects on natural habitat. The existing biodiversity on site is, however, relatively limited in terms of uniqueness or potential presence of species of concern, with the possible presence of one Critically Endangered mammal species.

The vegetation on site is not considered to be part of any threatened ecosystem and has not been assessed as being of high conservation value due to rates of transformation. The regional vegetation types that occur on site, i.e., Eastern Upper Karoo and Upper Karoo Hardeveld, are both widespread and have low rates of transformation across their geographical range. There are three plant species of conservation concern that could possibly occur on site, but none were seen during general field surveys.

To determine sensitivity on site, local and regional factors were taken into account. There are some habitats on site that have been described as sensitive in their own right, irrespective of regional assessments. This includes primarily the dry stream beds and associated riparian zones. Rocky outcrops and steep slopes are more sensitive than surrounding areas, mainly due to higher floristic diversity and the likelihood of plant species with low local abundance occurring there.

At a regional level, the Critical Biodiversity Area (CBA) map for Northern Cape indicates one drainage line, along with a buffer on each side, that is designated as being a CBA1 area. The remaining drainage lines of the study area are indicated as being Ecological Support Areas (ESAs).

In terms of other species of concern and overall biological diversity, including both plants and animals, the low hills and mountain ranges are the areas with the most species as well as being most likely to contain any species of concern. However, the southern main drainage line is the most likely habitat for the Critically Endangered Riverine Rabbit, if it occurs on site, which is unknown but possible.

Potential negative impacts due to construction or operation of the proposed grid connection infrastructure on terrestrial ecology will have a significance of low or medium. If appropriate mitigation measures are put in place, all impacts can be reduced to having low significance after mitigation. On the basis of this assessment, the opinion is that the project should be able to proceed on condition the recommended mitigation measures are put in place to minimise predicted impacts.

8.2.2 Impacts on Aquatic Ecology

Based on a combination of desktop and in-field delineation, three (3) forms of a watercourses were identified and delineated within the corrodor. These include episodic rivers, drainage lines and dams. No natural wetland systems, or even cryptic wetlands were identified for the project area. Episodic rivers refer

to systems formed from run-off channels in very dry regions. The rivers and drainage lines are both classified as a river hydrogeomorphic (HGM) type systems. The dams are regarded as artificial systems and typically formed / created in the preferential flow paths of the river HGM types. The drainage lines are not characterised by riparian vegetation and grasses. These systems represent bare surfaces with evidence of surface run-off.

The results of the habitat assessment indicate natural (class A) and largely natural (class B) instream and riparian conditions for the catchment, respectively. The overall ecological importance and sensitivity for the area was determined to be high. The overall ecosystem service benefit for the system is moderate.

The recommended buffer was calculated to be 15m for the drainage lines and rivers for the construction and operational phases.

The pre-mitigation impact significance for all considered aspects is expected to be medium. The expected post-mitigation impact significance is expected to be low, should all mitigation measures and recommendations be implemented.

It is the opinion of the specialist that no fatal flaws are evident for the project. Due to the expected low port-mitigating risks, the project qualifies for a General Authorisation.

8.2.3 Impacts on Avifauna

The SABAP2 data indicates that a total of 167 bird species could potentially occur within the study area and immediate surroundings (Appendix 1 of the avifauna report provides a comprehensive list of all the species). Of these, 49 species are classified as priority species and 12 of these are South African Red List species. Of the priority species, 35 are likely to occur regularly at the study area and immediate surrounding area, and another 14 could occur sporadically.

An integrated pre-construction monitoring programme was implemented at the proposed Great Karoo Cluster of Renewable Energy Facilities (i.e., Kwana, Moriri and Nku Solar Energy Facilities (SEF) and Angora and Merino Wind Energy Facilities (WEF)) between October 2020 and November 2021. The programme comprised of six seasonal surveys of both the proposed study areas and an identified control site within the broader study area. In order to describe the avifaunal community present, a concerted effort was made to sample the avifauna in all of the primary habitats that were available by applying walked and driven transects, vantage point, focal point and incidental survey techniques.

The surveys produced a combined list of 113 species (Appendix 3) covering both the Great Karoo Cluster of Renewable Energy Facilities study area and to a limited extent, the surrounding area.
The expected impacts of the Great Karoo EGI 132kV central collector substation and 132kV overhead power line were rated to be of MEDIUM significance and negative status pre-mitigation. However, with appropriate mitigation, the overall post-mitigation significance of the identified impacts should be reduced to LOW negative. No fatal flaws were discovered in the course of the investigation. It is therefore recommended that the activity is authorised, on condition that the proposed mitigation measures are strictly implemented.

8.2.4 Impacts on Land Use, Soils and Agricultural Potential

Various soil forms were identified within the project area with the most sensitive soils being classified as the Tubatse, Oakleaf and Bethesda soil forms. These soil forms have been determined to be associated with one land capability, namely LCIII (grazing land). This land capability class was then further refined to a land potential level 6 by comparing land capability of climatic capabilities of the project area.

This land potential level was used to determine the sensitivities of soil resources. Only "Low" sensitivities were determined throughout the project area by means of baseline findings.

Low pre- and post-mitigation significance ratings are expected for the construction phase. During the operational phase, the pre-mitigation significance will be medium. This can be reduced to low significance through implementation of the recommended mitigation measures.

Considering the low sensitivities associated with land potential resources, it is the specialist's opinion that the proposed activities will have an acceptable impact on soil resources and that the proposed activities should proceed as have been planned.

8.2.5 Heritage Impacts (Including Archaeology, Palaeontology and Cultural Landscape)

The landscape of the development area has been assessed for cultural heritage significance, and found to have five distinct character areas:

» Historic movement corridors.
» Open plains interrupted by low koppies.
» Elevated areas with steep sided mountain ridges.
» Areas of landscape that have been transformed by significant infrastructural development.
» Remote landscape with wilderness qualities.

Of the five distinct character areas identified in the Cultural Landscape Assessment (Winter, 2021), the grid connection corridor falls within Area 4 - Areas of landscape that have been transformed by significant infrastructural development.

A total of thirty (30) archaeological observations were identified along the grid corridor. None of the identified archaeological resources were determined to be conservation worthy. Six modern windmill and water storage structures were identified within the grid alignment but none of these were determined to be conservation worthy.

No palaeontological Very High Sensitivity / No-Go areas have been identified within the grid connection project areas. With the exception of two fossil sites of low scientific value, none of the recorded fossil sites overlaps directly with, or lies close to (< 20 m), the proposed infrastructure.
It is not anticipated that the proposed development of the grid connection infrastructure will negatively impact on significant heritage resources.

8.2.6 Visual Impacts

The construction and operation of the proposed grid connection infrastructure for the Great Karoo Cluster of Renewable Energy Facilities, may have a visual impact on the study area, especially within (but potentially not restricted to) a 0.5 - 1.5km radius of the power line and substation structures. The visual impact will differ amongst places, depending on the distance from the infrastructure.

Overall, the significance of the visual impacts is expected to range from moderate to low as a result of the generally undeveloped character of the landscape. No visual impacts of a high significance are expected to occur.

Given the remote location of the infrastructure, the general absence of sensitive visual receptors and the close proximity of the proposed alignments next to each other, either of the power line alternatives would be acceptable.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed grid connection infrastructure.

If mitigation is implemented as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the grid connection infrastructure for the Great Karoo Cluster of Renewable Energy Facilities is considered to be acceptable from a visual impact perspective.

8.2.7 Social Impacts

Impacts are expected to occur with the development of the Great Karoo EGI during the construction, operation and decommissioning phases. Both positive and negative impacts are identified and assessed.

Positive impacts during construction include:
» Creation of employment and business opportunities, and the opportunity for skills development and on-site training.

Negative impacts during construction include:
» Impacts associated with the presence of construction workers on local communities.
» Noise, dust, and safety impacts of construction related activities and vehicles.
» Risk of veld fires.
» Risks posed to farming activities by construction workers.

Positive impacts during operation include:
» Improved energy security and establishment of energy infrastructure.
» Creation of employment, skills development, and local procurement opportunities.
» Generate income for landowners.

Negative impacts during operation include:
» The visual impacts and associated impact on sense of place.
» Risks posed to farming activities by maintenance workers.

Social impacts during the decommissioning phase are expected to be similar to those that take place during the construction phase.

The energy security benefits associated with the proposed Great Karoo Renewable Energy Cluster are dependent upon it being able to connect to the national grid via the establishment of grid connection infrastructure. The findings of the SIA indicate that the significance of the potential negative social impacts for both the construction and operational phase of the proposed grid connection are Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The alignment was also regarded as acceptable by affected landowners interviewed.

The power line is also located within the Central Transmission Corridor. The establishment of proposed Great Karoo Electrical Grid Infrastructure (EGI) is therefore supported by the findings of the SIA.

8.2.8 Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of the Great Karoo EGI 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 Great Karoo EGI is to test 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.

A summary of the cumulative impacts is included in **Table 8.1** below.

Table 8.1: Summary of the cumulative impact significance for the Great Karoo EGI

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	Medium	Medium
Aquatic Ecology	Low	Medium
Avifauna	Low Low Low Low Low	Medium Medium Medium Low Low
Land use, soil and agricultural potential	Low	Low
Heritage (including archaeology, palaeontology and sense of place)	Low	Low
Visual	Low	Medium
Social	*Negative impacts:* Medium	*Negative impacts:* Medium

Based on the specialist cumulative assessment and findings, the development of the Great Karoo and its contribution to the overall impact of all grid connection infrastructure within the broader area, it can be concluded that the Great Karoo cumulative impacts will be of a medium to low significance. Therefore, the

development of the Great Karoo EGI will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

8.3. Environmental Sensitivity Mapping

As part of the specialist studies undertaken within the development footprint of the 132kV collector substation, and 1km power line corridor, specific sensitive environmental features and areas were identified (refer to **Figure 8.1**). The sensitive features identified specifically relate to terrestrial and aquatic ecology, avifauna, and heritage resources, and are detailed below:

- **Terrestrial Ecology:** Sensitivities that occur within the grid connection corridor include:
  - Drainage lines/CBA1 (high – very high sensitivity)
  - Mountain slopes (medium – high sensitivity)
  - Karroid plains (medium sensitivity)
  - Infrastructure (roads) (low sensitivity)
- **Aquatic Ecology:** The drainage lines and rivers that traverse the grid connection corridor are considered to be of high sensitivity and a 15m no-go buffer has been recommended around these features.
- **Avifauna:** At a site-specific level, environmentally sensitive features present within the proposed study area include the existing eagle nests, in addition to permanent and ephemeral waterbodies. These areas are classified as areas of HIGH sensitivity. Construction in the areas containing eagle nests will need to be carefully managed to ensure minimal disturbance to the breeding birds and/or their progeny. The construction of the proposed power line across or within close proximity to the waterbodies will necessitate the marking of the power line with bird flight diverters to mitigate the collision impact. The remainder of the study area is considered to be of MEDIUM sensitivity, given its propensity to support Ludwig's Bustard.
- **Heritage:** A total of thirty (30) archaeological heritage resources and six (6) palaeontological heritage resources were identified during the survey of the grid connection corridor and substation footprint. None of the identified heritage resources are regarded to be conservation worthy or of significance and as such, no buffers have been recommended around these sites.

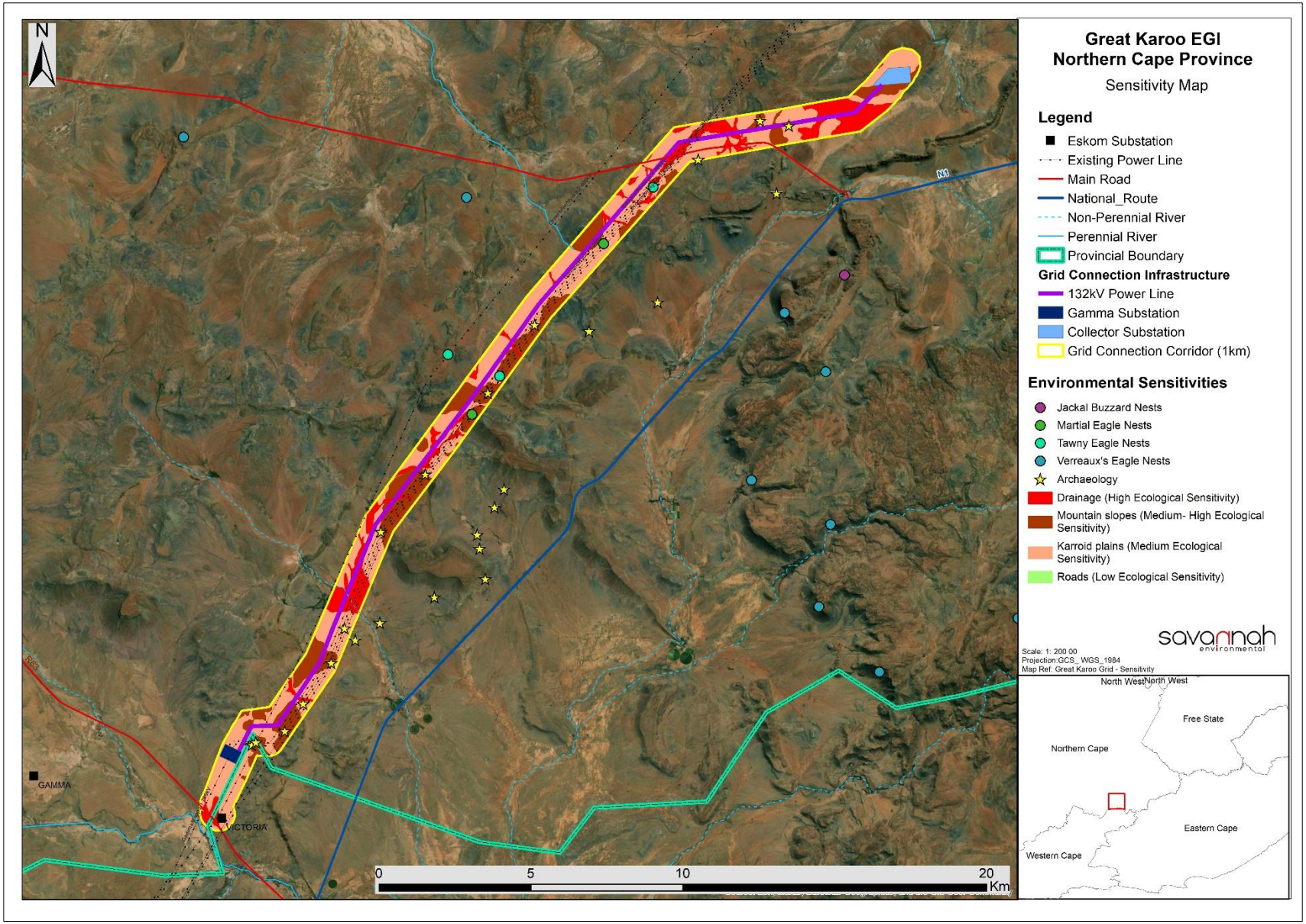


Figure 8.1: Environmental sensitivity and layout map of the Great Karoo EGI

8.4. Environmental Costs of the Great Karoo EGI Versus Benefits

Environmental costs (including those to the natural environment, economic and social environment) can 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 generic EMPrs, are implemented and adhered to. No fatal flaws have been identified. These environmental costs could include:

- *Loss of* biodiversity – Areas considered to be of high sensitivity have been identified within the grid corridor and may be impacted on by the proposed development.
- The cost of loss of biodiversity has been minimised/avoided through the limited placement of project components and infrastructure within the ecological features, and avifauna and bat sensitive areas
- *Impacts on avifauna* – The cost of the loss of habitat and the loss of avifauna due to collision and electrocution is considered high due to the presence of priority species nests within the corridor. Impacts can be minimised through the implementation of mitigation measures. No impacts of high significance were identified.
- *Visual impacts associated with the Great Karoo EGI* – The visual environment surrounding the power line and substation, especially within a 1.5km radius, may be visually impacted upon for the anticipated operational lifespan of the grid connection infrastructure. No mitigation of this impact is possible (i.e., the infrastructure will be visible in the landscape), but general mitigation and management are required as best practise to minimise secondary visual impacts which may arise from mismanagement of the site.
- *Impacts on aquatic resources* – Drainage lines and a river which are both considered to be of high sensitivity traverse the grid corridor and may be impacted (either directly or indirectly) by the proposed grid connection infrastructure.
- *Loss of land for agriculture* – The development will remove areas of low land capability. As the site is used for grazing, activities can continue during operation and impacts in this regard are therefore limited.
- *Loss of archaeological and palaeontological resources* – A number of archaeological and palaeontological resources were identified during the survey of the grid corridor and substation footprint which may be impacted on by the proposed development. None of the identified sites of are considered to be conservation worth or of significance from a heritage perspective.

Benefits of the establishment of the Great Karoo EGI include the following:

- The project will cater for five renewable energy facilities, thereby ensuring that the facilities are able to connect to the national grid.
- The project will contribute towards the Provincial and Local IDP objectives for the provision of electricity.
- The project will result in important economic benefits at the local and regional scale through job creation, income, and other associated downstream economic development. These will persist during the pre-construction, construction, operation and decommissioning phases of the project.
- The project provides an opportunity for a new land use on the affected properties, which is considered as a more efficient use of the land.

The benefits of the Great Karoo EGI are expected to occur at a national, regional and local level. If the costs to the environment can be largely limited through the appropriate placement of infrastructure within the assessed corridor and footprint, within lower sensitive areas through avoidance of features and areas considered to be sensitive, the benefits of the project are expected to outweigh the environmental costs of the project.

8.5. Overall Conclusion (Impact Statement)

A technically viable footprint for the collector substation and a 1km power line corridor were proposed by the developer and assessed as part of the BA process. The assessment of the development footprint as well as the 1km power line corridor was undertaken by independent specialists and their findings have informed the results of this BA Report.

The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the development footprint and assessed corridor within the project site. The developer has designed a project development footprint and power line corridor in response to the identified sensitive environmental features and areas present within the project site. The location of the central collector substation was informed by environmental sensitivities within the development area for the Merino Wind Farm (one of the renewable energy facilities that the Great Karoo EGI will provide a grid connection solution).

Impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. This is however not relevant for the visual impact of the infrastructure as the substation and power line will be visible regardless of the mitigation applied. However, this impact is not considered as a fatal flaw by the specialist.

Through the assessment of the development footprint and power line corridor within the project site, it can be concluded that the development of the Great Karoo EGI is environmentally acceptable (subject to the implementation of the recommended mitigation measures).

8.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer for the collector substation, the 1km power line corridor, avoidance of sensitive environmental features within the project site, 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 proposed development of the Great Karoo EGI is acceptable within the landscape and can be reasonably authorised (**Figure 8.2**)

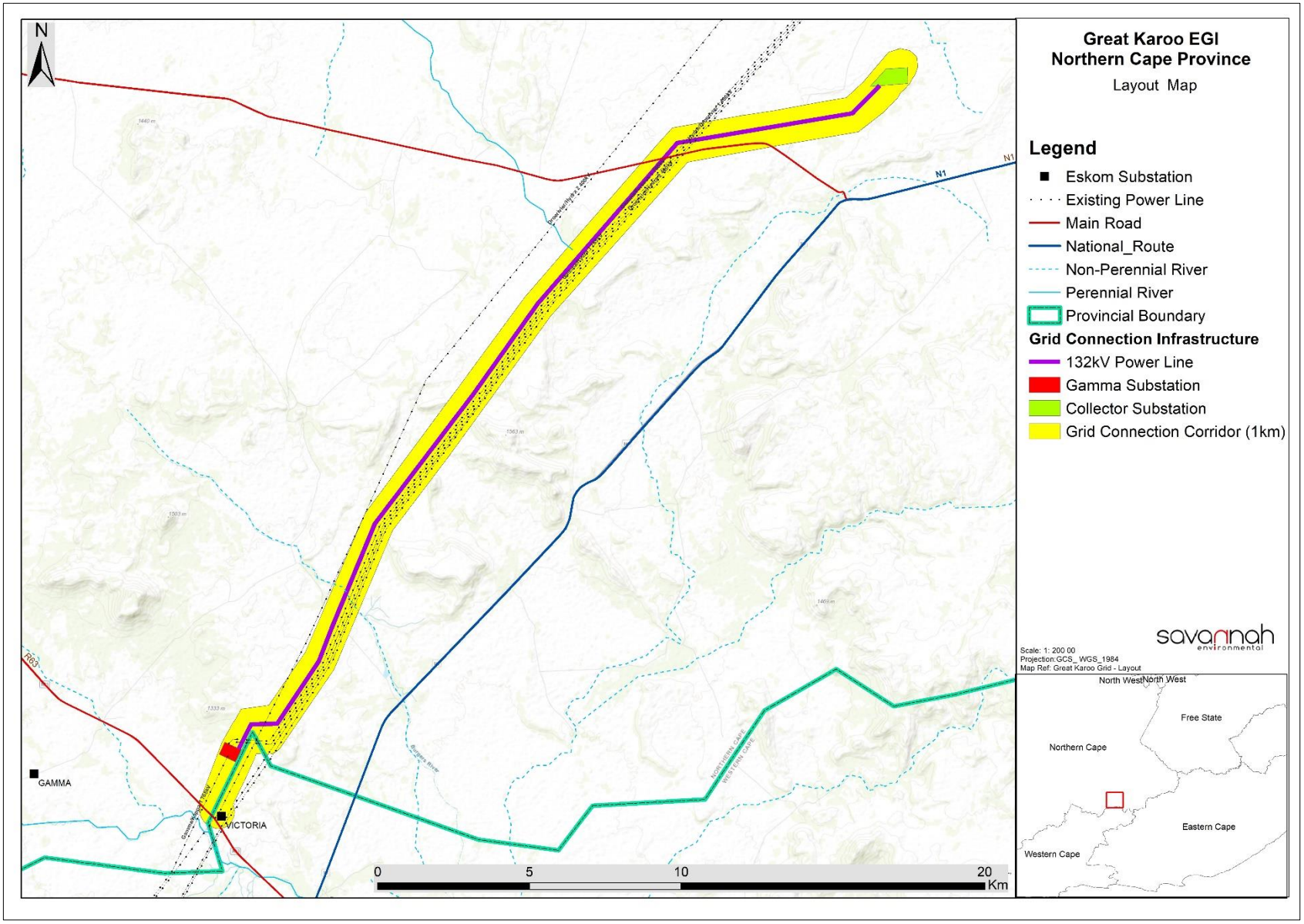


Figure 8.2: Final preferred layout for the Great Karoo EGI considered to be acceptable for development

The following infrastructure would be included within an authorisation issued for the project:

- A 132kV collector substation with a development footprint of 19.95ha.
- A double circuit 132kV distribution line to connect the central collector 132kV substation to the existing Eskom Gamma Substation will be constructed.
- Temporary and permanent laydown areas.
- Associated equipment, infrastructure and buildings.
- A 4 -6 m wide road along the length of the power line corridor to allow for large crane movement and for maintenance purposes.

The following key conditions would be required to be included within the environmental authorisation issued for the Great Karoo EGI:

- All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D** to **J**, are to be implemented.
- The EMPrs as contained within **Appendix N** and **O** of this BA Report should form part of the contract with the Contractor appointed to construct and the maintain the substation and power lines in order to ensure compliance with environmental specifications and management measures. The implementation of these EMPrs for all life cycle phases of the substation and power lines is considered key in achieving the appropriate environmental management standards as detailed for this project.
- Following the final design of the grid connection infrastructure, a final layout and route must be submitted to the DFFE for review and approval prior to commencing with construction activities. No development is permitted within the identified 'no-go' areas as detailed in **Figure 8.1**.
- A pre-construction walk-through of the development footprint and power line corridor must be undertaken before construction comments and the layout and corridor should be adjusted, where required, to reduce impacts on species of conservation concern, habitats of concern and heritage resources.
- Obtain all other mandatory and environmental permits/licenses for the project, as required.
- Implement a chance finds procedure for the rescuing of any fossils or heritage resources discovered during construction.

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

CHAPTER 9: REFERENCES

Ecology Impact Assessment (Terrestrial Biodiversity)

FAIRBANKS, D.H.K., THOMPSON, M.W., VINK, D.E., NEWBY, T.S., VAN DEN BERG, H.M & EVERARD, D.A. 2000. The South African Land-Cover Characteristics Database: a synopsis of the landscape. S.Afr.J.Science 96: 69-82.

HOLNESS, S. and OOSTHUYSEN, E. 2016. Critical Biodiversity Areas of the Northern Cape: Technical Report.

MUCINA, L. AND RUTHERFORD, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. Strelitzia 19, South African National Biodiversity Institute, Pretoria.

MUCINA, L., RUTHERFORD, M.C. AND POWRIE, I.W. (editors) 2005. Vegetation map of South Africa, Lesotho and Swaziland, 1:1 000 000 SCALE SHEET MAPS South African National Biodiversity Institute, Pretoria.

MYERS, N., MITTERMEIR, R.A., MITTERMEIR, C.G., DE FONSECA, G.A.B., AND KENT, J. 2000. Biodiversity hotspots for conservation priorities. Nature 403, 853-858.

RUTHERFORD, M.C. AND WESTFALL., R.H. 1994. Biomes of Southern Africa. An objective characterisation. Memoirs of the Botanical Survey of South Africa 63, 1-94.

RUTHERFORD, M.C., MUCINA, L. AND POWRIE, L.W. 2006. Biomes and Bioregions of Southern Africa. In: L. Mucina and M.C. Rutherford (Eds). The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, pp. 30-51. South African National Biodiversity Institute, Pretoria.

VAN WYK, A.E. AND SMITH, G.F. (Eds) 2001. Regions of Floristic Endemism in Southern Africa: A review with emphasis on succulents, pp. 1-199. Umdaus Press, Pretoria.

Ecology Impact Assessment (Plant Species)

GERMISHUIZEN, G., MEYER, N.L., STEENKAMP, Y and KEITH, M. (eds.) (2006). A checklist of South African plants. Southern African Botanical Diversity Network Report No. 41, SABONET, Pretoria.

IUCN (2001). IUCN Red Data List categories and criteria: Version 3.1. IUCN Species Survival Commission: Gland, Switzerland.

MUCINA, L. AND RUTHERFORD, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. Strelitzia 19, South African National Biodiversity Institute, Pretoria.

VAN WYK, A.E. AND SMITH, G.F. (Eds) 2001. Regions of Floristic Endemism in Southern Africa: A review with emphasis on succulents, pp. 1-199. Umdaus Press, Pretoria.

Freshwater Impact Assessment

David Hoare Consulting. 2010. Specialist ecological study on the impacts of the proposed Karoo Renewable Energy Facility Project, near Victoria West, Northern Cape.

Day, J., Day, E., Ross-Gillespie, V., and Ketley, A. 2010. The Assessment of Temporary Wetlands During Dry Conditions. Report to the Water Research Commission (WRC). Report Number TT 434/09.

Department of Water Affairs and Forestry (DWAF). 2005. A practical field procedure for identification and delineation of wetlands and riparian areas. Pretoria: Department of Water Affairs and Forestry.

Kotze, D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.C. & Collins, N.B. (2009). A Technique for rapidly assessing ecosystem services supplied by wetlands. Mondi Wetland Project.

Land Type Survey Staff. (1972 - 2006). Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Macfarlane DM and Bredin IP. 2017. Part 1: technical manual. Buffer zone guidelines for wetlands, rivers and estuaries

Macfarlane, D.M., Bredin, I.P., Adams, J.B., Zungu, M.M., Bate, G.C., Dickens, C.W.S. (2014). Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries. Final Consolidated Report. WRC Report No TT 610/14, Water Research Commission, Pretoria.

Macfarlane, D.M., Dickens, J. & Von Hase, F. (2009). Development of a methodology to determine the appropriate buffer zone width and type for developments associated with wetlands, watercourses and estuaries Deliverable 1: Literature Review. INR Report No: 400/09.

Mucina, L. & Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.

Nel JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Ollis DJ, Snaddon CD, Job NM, and Mbona N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria.

Rountree, M.W. and Kotze, D.M. 2013. Manual for the Rapid Ecological Reserve Determination of Inland Wetlands (Version 2.0). Joint Department of Water Affairs/Water Research Commission Study. Report No 1788/1/12. Water Research Commission, Pretoria.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). (2019). South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Smith, B. (2006). The Farming Handbook. Netherlands & South Africa: University of KwaZulu-Natal Press & CTA.

Soil Classification Working Group. (1991). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Soil Classification Working Group. (2018). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Van Deventer, H., Smith-Adao, L., Collins, N.B., Grenfell, M., Grundling, A., Grundling, P-L., Impson, D., Job, N., Lötter, M., Ollis, D., Petersen, C., Scherman, P., Sieben, E., Snaddon, K., Tererai, F. and Van der Colff D. 2019. South African National Biodiversity Assessment 2018: Technical Report. Volume 2b: Inland Aquatic (Freshwater) Realm. CSIR report number CSIR/NRE/ECOS/IR/2019/0004/A. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6230.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa.

Avifauna Impact Assessment

ANIMAL DEMOGRAPHY UNIT. 2020. The southern African Bird Atlas Project 2. University of Cape Town. http://sabap2.adu.org.za.

ALONSO, J. A. AND ALONSO, J. C. 1999 Collision of birds with overhead transmission lines in Spain. Pp. 57–82 in Ferrer, M. and Janss, G. F. E., eds. Birds and power lines: Collision, electrocution and breeding. Madrid, Spain: Quercus.Google Scholar

AVIAN POWER LINE INTERACTION COMMITTEE (APLIC). 2012. Mitigating Bird Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute. Washington D.C.

BARRIENTOS R, PONCE C, PALACIN C, MARTÍN CA, MARTÍN B, ET AL. 2012. Wire marking results in a small but significant reduction in avian mortality at power lines: A BACI Designed Study. PLoS ONE 7(3): e32569. doi:10.1371/journal.pone.0032569.

BARRIENTOS, R., ALONSO, J.C., PONCE, C., PALACÍN, C. 2011. Meta-Analysis of the effectiveness of marked wire in reducing avian collisions with power lines. Conservation Biology 25: 893-903.

BEAULAURIER, D.L. 1981. Mitigation of bird collisions with transmission lines. Bonneville Power Administration. U.S. Dept. of Energy.

BERNARDINO, J., BEVANGER, K., BARRIENTOS, R., DWYER, J.F. MARQUES, A.T., MARTINS, R.C., SHAW, J.M., SILVA, J.P., MOREIRA, F. 2018. Bird collisions with power lines: State of the art and priority areas for research. https://doi.org/10.1016/j.biocon.2018.02.029. Biological Conservation 222 (2018) 1 – 13.

ENDANGERED WILDLIFE TRUST. 2014. Central incident register for power line incidents. Unpublished data.

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.

HOBBS, J.C.A. & LEDGER J.A. 1986a. The Environmental Impact of Linear Developments; Power lines and Avifauna. Proceedings of the Third International Conference on Environmental Quality and Ecosystem Stability. Israel, June 1986.

HOBBS, J.C.A. & LEDGER J.A. 1986b. Power lines, Birdlife and the Golden Mean. Fauna and Flora, 44:23-27.

HOCKEY P.A.R., DEAN W.R.J., AND RYAN P.G. 2005. Robert's Birds of Southern Africa, seventh edition. Trustees of the John Voelcker Bird Book Fund, Cape Town.

JENKINS, A. & SMALLIE, J. 2009. Terminal velocity: the end of the line for Ludwig's Bustard? Africa Birds and Birding. Vol 14, No 2.

JENKINS, A., DE GOEDE, J.H. & VAN ROOYEN, C.S. 2006. Improving the products of the Eskom Electric Eagle Project. Unpublished report to Eskom. Endangered Wildife Trust.

JENKINS, A.R., DE GOEDE, J.H., SEBELE, L. & DIAMOND, M. 2013. Brokering a settlement between eagles and industry: sustainable management of large raptors nesting on power infrastructure. Bird Conservation International 23: 232-246.

JENKINS, A.R., SMALLIE, J.J. & DIAMOND, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 20: 263-278.

KOOPS, F.B.J. & DE JONG, J. 1982. Vermindering van draadslachtoffers door markering van hoogspanningsleidingen in de omgeving van Heerenveen. Electrotechniek 60 (12): 641 – 646.

KRUGER, R. & VAN ROOYEN, C.S. 1998. Evaluating the risk that existing power lines pose to large raptors by using risk assessment methodology: The Molopo Case Study. Proceedings of the 5th World Conference on Birds of Prey and Owls. August 4-8,1998. Midrand, South Africa.

KRUGER, R. 1999. Towards solving raptor electrocutions on Eskom Distribution Structures in South Africa. Bloemfontein (South Africa): University of the Orange Free State. (M. Phil. Mini-thesis)

LEDGER, J. 1983. Guidelines for Dealing with Bird Problems of Transmission Lines and Towers. Eskom Test and Research Division. (Technical Note TRR/N83/005).

LEDGER, J.A. & ANNEGARN H.J. 1981. Electrocution Hazards to the Cape Vulture (Gyps coprotheres) in South Africa. Biological Conservation 20:15-24.

LEDGER, J.A. 1984. Engineering Solutions to the Problem of Vulture Electrocutions on Electricity Towers. The Certificated Engineer, 57:92-95.

LEDGER, J.A., J.C.A. HOBBS & SMITH T.V. 1992. Avian Interactions with Utility Structures: Southern African Experiences. Proceedings of the International Workshop on Avian Interactions with Utility Structures. Miami (Florida), Sept. 13-15, 1992. Electric Power Research Institute.

MARNEWICK, M.D., RETIEF E.F., THERON N.T., WRIGHT D.R., ANDERSON T.A. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: Birdlife South Africa.

MARTIN, G., SHAW, J., SMALLIE J. & DIAMOND, M. 2010. Bird's eye view – How birds see is key to avoiding power line collisions. Eskom Research Report. Report Nr: RES/RR/09/31613.

MUCINA. L. & RUTHERFORD, M.C. (Eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

PALMER, A.R. and HOFFMAN, M.T. 1997. Nama Karoo. Pages 167-186 in R.M. Cowling. D.M. Richardson, and S.M. Pierce, editors. Vegetation of Southern Africa. Cambridge University Press, Cambridge

SHAW, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

SHAW, J.M., PRETORIUS, M.D., GIBBONS, B., MOHALE, O., VISAGIE, R., LEEUWNER, J.L.& RYAN, P.G. 2017. The effectiveness of line markers in reducing power line collisions of large terrestrial birds at De Aar, Northern Cape. Eskom Research, Testing and Development. Research Report. RES/RR/17/1939422.

SPORER, M.K., DWYER, J.F., GERBER, B.D, HARNESS, R.E, PANDEY, A.K. 2013. Marking Power Lines to Reduce Avian Collisions Near the Audubon National Wildlife Refuge, North Dakota. Wildlife Society Bulletin 37(4):796–804; 2013; DOI: 10.1002/wsb.329

TAYLOR, M.R., PEACOCK F, & WANLESS R.W (eds.) 2015. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg, South Africa.

VAN ROOYEN, C.S. & LEDGER, J.A. 1999. Birds and utility structures: Developments in southern Africa. Pp 205-230, in Ferrer, M. & G.F.M. Janns. (eds.). Birds and Power lines. Quercus, Madrid (Spain). Pp 238.

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 2-3 December 1999. Charleston, South Carolina.

VAN ROOYEN, C.S. 1998. Raptor mortality on power lines in South Africa. Proceedings of the 5th World Conference on Birds of Prey and Owls. Midrand (South Africa), Aug.4 – 8, 1998.

VAN ROOYEN, C.S. 1999. An overview of the Eskom-EWT Strategic Partnership in South Africa. EPRI Workshop on Avian Interactions with Utility Structures Charleston (South Carolina), Dec. 2-3 1999.

VAN ROOYEN, C.S. 2004. The Management of Wildlife Interactions with overhead lines. In: The fundamentals and practice of Overhead Line Maintenance (132kV and above), pp217-245. Eskom Technology, Services International, Johannesburg.

VAN ROOYEN, C.S. 2000. An overview of Vulture Electrocutions in South Africa. Vulture News, 43: 5-22. (Vulture Study Group, Johannesburg, South Africa).

VAN ROOYEN, C.S. 2007. Eskom-EWT Strategic Partnership: Progress Report April-September 2007. Endangered Wildlife Trust, Johannesburg.

VAN ROOYEN, C.S. VOSLOO, H.F. & R.E. HARNESS. 2002. Eliminating bird streamers as a cause of faulting on transmission lines in South Africa. Proceedings of the IEEE 46th Rural Electric Power Conference. Colorado Springs (Colorado), May. 2002.

VERDOORN, G.H. 1996. Mortality of Cape Griffons Gyps coprotheres and African Whitebacked Vultures Pseudogyps africanus on 88kV and 132kV power lines in Western Transvaal, South Africa, and mitigation measures to prevent future problems. Proceedings of the 2nd International Conference on Raptors: Urbino (Italy), Oct. 2-5, 1996.

Land Use, Soil, and Agricultural Potential Impact Assessment

Department of Primary Industries and Regional Development. 2017. Deep ripping for soil compaction. https://www.agric.wa.gov.au/soil-compaction/deep-ripping-soil-compaction.

Land Type Survey Staff. 1972 - 2006. Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Mucina, L., & Rutherford, M. C. 2006. The Vegetation of South Africa, Lesotho, and Swaziland. Strelitzia 19. Pretoria: National Biodiversity Institute.

Russell, W. 2009. WET-RehabMethods. National guidelines and methods for wetland rehabilitation.

Smith, B. 2006. The Farming Handbook. Netherlands & South Africa: University of KwaZulu-Natal Press & CTA.

Soil Classification Working Group. 1991. Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Soil Classification Working Group. 2018. Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Heritage Impact Assessment

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
120317	HIA Phase 1	Celeste Booth, Sholeen Shanker	01/12/2012	An archaeological ground-truthing walk-through for the proposed substation and associated overhead power line for the Nobelsfontein Wind Energy Facility situated on a site south of Victoria West on the Farm Nobelsfontein 227, Northern Cape Province
120325	HIA Phase 1	Celeste Booth, Sholeen Shanker	01/12/2012	An archaeological ground-truthing walk-through for the proposed substation and associated overhead power line for the Nobelsfontein Wind Energy Facility situated on a site south of Victoria West on the Farm Nobelsfontein 227, Northern Cape Province
120325	HIA Phase 1	Celeste Booth, Sholeen Shanker	01/12/2012	An archaeological ground-truthing walk-through for the proposed substation and associated overhead power line for the Nobelsfontein Wind Energy Facility situated on a site south of Victoria West on the Farm Nobelsfontein 227, Northern Cape Province
120820	HIA Phase 1	Celeste Booth	01/12/2012	An Archaeological Ground-Truthing Walk-Through For The Nobelsfontein Wind Energy Facility Situated On A Site South Of Victoria West On The Farms Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235, And Rietkloofplaaten 239, Northern Cape Province
251290	PIA Desktop	Lloyd Rossouw	01/01/2014	Combined Environmental Environmental Impact Assessment for the proposed Ishwati Emoyeni Wind Energy Facility and Supporting Eskom Transmission and Eskom Distribution Grid Connection Infrastructure near Murraysburg, Western Cape. Chapter 13: Palaeontology Impact Assessment.

251296	AIA Phase 1	Dave Halkett	01/01/2014	Combined Environmental Impact Assessment for the proposed Ishwati Emoyeni Wind Energy Facility and Supporting Eskom Transmission and Eskom Distribution Grid Connection Infrastructure near Murraysburg, Western Cape. Chapeter 13: Archaeology Impact Assessment.
356942	AIA Phase 1	Johan Binneman, Celeste Booth, Natasha Higgitt	01/05/2010	A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED SKIETKUIL QUARRIES 1 AND 2 ON THE FARM SKIETKUIL No. 3, VICTORIA WEST, CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE
356942	AIA Phase 1	Johan Binneman, Celeste Booth, Natasha Higgitt	01/05/2010	A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED SKIETKUIL QUARRIES 1 AND 2 ON THE FARM SKIETKUIL No. 3, VICTORIA WEST, CENTRAL KAROO DISTRICT, WESTERN CAPE PROVINCE
357137	Heritage Impact Assessment Specialist Reports	Timothy Hart	13/10/2015	Heritage Impact Assessment for the proposed Umsinde Emoyeni Wind Energy Facility
360840	Non Impact Assessment Related Reports	Wouter Fourie	05/03/2016	Environmental Impact Assessment of the proposed amendments to the Environmental Authorisation for the Mainstream Renewable Power South Africa Wind Energy Project near Victoria West in the Northern Cape â€“ Specialist Heritage Opinion
360850	HIA Phase 1	Wouter Fourie	04/03/2016	Basic assessment process for Proposed development of supporting infrastructure to the Victoria West Wind Energy Facility, Victoria West
6805	AIA Phase 1	Len van Schalkwyk, Elizabeth Wahl	01/09/2007	Heritage Impact Assessment of Gamma Grassridge Power Line Corridors and Substation, Eastern, Western and Northern Cape Provinces, South Africa
7035	AIA Phase 1	Johan Binneman, Celeste Booth, Natasha Higgitt	05/03/2011	A Phase 1 Archaeological Impact Assessment (AIA) for the proposed Karoo Renewable Energy Facility on a site south of Victoria West, Northern and Western Cape Province on the farms Phaisantkraal 1, Modderfontein 228, Nobelsfontein 227, Annex Nobelsfontein
7036	AIA Desktop	Celeste Booth, Natasha Higgitt	19/11/2010	An Archaeological Desktop Study for the proposed Karoo Renewable Energy Facility on a site south of Victoria West, Northern and Western Cape

8943	PIA Phase 1	Lloyd Rossouw	24/03/2011	Palaeontological desktop assessment of a commercial renewable energy facility site located approximately 34km south of Victoria West in the Western Cape Province (and Northern Cape)

Visual Impact Assessment

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 Northern Cape 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

Social Impact Assessment

The National Development Plan (2011).
The New Growth Framework (2010).
The National Infrastructure Plan (2012).
The Integrated Energy Plan (1998).
Northern Cape Provincial Growth and Development Strategy (2004-2014).
Northern Cape Climate Change Response Strategy.
Northern Cape Spatial Development Framework (2012).
Northern Cape Province Green Document (2017/2018).
Pixley ka Seme District Municipality Integrated Development Plan (2019-2020).
Pixley ka Seme District Municipality Spatial Development Framework (2017).
Ubuntu Local Municipality Integrated Development Plan (2019-2020).

Interviews

De Jager, Mr Louis (telephonic, 2021-12-07). Owner Nuwefontein and Uitvlugfontein farms.
De Vries, Mr Andre (telephonic, 2021-12-07). Owner Bultfontein farm.
Esterhuizen, Mr Hannes (telephonic, 2021-12-10). Owner Poortjie farm.
Esterhuizen, Mr Hennie (telephonic, 2021-12-06). Owner Wynandsfontein farm.
Hugo, Mr Danny (telephonic, 2021012-06). Owner Burgersfontein farm.
Reynolds, Mr Kobus (telephonic, 2021-12-07). Owner Nuwefontein farm.

Van der Heever, Mr Stephanus (2021-12-06). Owner Excelsior farm.
Van der Merwe, Mr Pieter (2021-12-06). Owner Rondawel farm.
Wasserfall, Mr Leon (telephonic 2021-12-09). Owner Roggefontein farm.