

# CAROLUS ELECTRICAL GRID INFRASTRUCTURE (EGI), NORTHERN CAPE PROVINCE

Basic Assessment Report

January 2023

savannah  
environmental

t +27 (0)11 656 3237

f +27 (0)86 684 0547

e info@savannahsa.com

w www.savannahsa.com

**Prepared for:**

**Carolus Solar PV1 (Pty) Ltd**

Top Floor Golf Park 4, Raapenberg Rd, Mowbray, 7700  
PO Box 548, Howard Place, 7450  
7450

**Prepared by:**



## PROJECT DETAILS

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<b>Authors</b>	:	Savannah Environmental (Pty) Ltd Debbie-Lee Janse van Rensburg Nkhensani Masondo Jo-Anne Thomas
<b>Client</b>	:	Carolus Solar PV1 (Pty) Ltd
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**When used as a reference this report should be cited as:** Savannah Environmental (2023) Basic Assessment Report for the Carolus Electrical Grid Infrastructure (EGI), Northern Cape Province.

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## PURPOSE OF THE BASIC ASSESSMENT REPORT

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Carolus Solar PV1 (Pty) Ltd has appointed Savannah Environmental as the independent environmental consultant to undertake the Basic Assessment (BA) for the Carolus Electrical Grid Infrastructure (EGI), Northern Cape. 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 Basic Assessment (BA) report represents the findings of the BA process and contains the following chapters:

- » **Chapter 1** provides background to the Carolus EGI and the basic assessment process.
- » **Chapter 2** provides a description of the Carolus EGI.
- » **Chapter 3** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed Carolus EGI.
- » **Chapter 4** describes the need and desirability of the Carolus 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 direct, indirect and cumulative impacts associated with the Carolus EGI, 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 public review from **14 October – 14 November 2022** on the Savannah Environmental website (<https://savannahsa.com/public-documents/grid-infrastructure/carolus-grid-connection-infrastructure/>). All comments received and recorded during the 30-day review period have been included, considered and addressed within this Final BA report. All comments received has been recorded and responded to in a Comments and Responses Report, which is included in Appendix C8 of this final EIA Report.

## EXECUTIVE SUMMARY

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Carolus Solar PV1 (Pty) Ltd is proposing the construction and operation of grid connection infrastructure consisting of a up to 132kV Double circuit power line on Portion 3 of the Farm Carolus Poort No. 3, located approximately 10km east of De Aar, within the Emthanjeni Local Municipality of the Pixley Ka Seme District Municipality in the Northern Cape Province (**Figure 1.1**). The purpose of the Grid Connection Infrastructure (EGI) is to connect the Carolus PV Facility to the national grid.

The grid connection infrastructure will consist of the following:

- » Onsite 132kV Eskom switching station - 100m x 100m and 30m height, metering, relay & control buildings, laydown area, ablutions with conservancy tanks and water storage tanks, and access roads which is handed back to Eskom.
- » 132kV Overhead Power Line (OHPL) – 30m height from the switching station to the Main Transmission Substation (MTS) located on Vetlaagte (RE/4) and Wag en Bittje (RE/5) farms which will be handed back to Eskom (within 300m wide corridor and a 31m wide servitude).
- » Access roads to substation sites (up to 8 m wide) and service tracks (up to 6 m wide) where no existing roads are available.

One corridor of 300m wide and between 4.3km (to Wagt 'n Bietjie MTS) and 7.8km (to Vetlaagte MTS) long are being considered connecting to either the new Vetlaagte MTS located on the Farm Vetlaagte (RE/4) or Wag-n-Bietjie MTS, located on the Farm Wag en Bittje (RE/5). The entire extent of the site falls within the Central Corridor of the Strategic Transmission Corridors.

The project is planned as part of a larger cluster of proposed renewable energy projects, which includes four PV facilities (to be known as Fountain Solar PV1, Riet Fountain Solar PV1, Carolus Solar PV1 and Wagt Solar PV1), and associated grid connection infrastructure. These projects are proposed by separate Special Purpose Vehicles (SPVs) and are assessed through separate Environmental Impact Assessment (EIA) processes. Potential cumulative impacts of the cluster will be assessed in each separate process being undertaken.

### Impacts on Ecology (including Flora and Fauna)

The study area consists mostly of natural habitat that is used for grazing and livestock agriculture. 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 larger Pixley Park site (including the Carolus EGI) is situated in the Grassland and Nama Karoo biomes. The fine scale vegetation types that occur on site, i.e., Northern Upper Karoo, and the Besemkaree Koppies Shrubland, are both widespread and have low rates of transformation across their geographical range. The Plants of South Africa database indicates that 116 species of indigenous plants are expected to occur within the project area and surrounding landscape. None of the species expected are species of conservation concern. It is the opinion of the specialist that the authorisation of the proposed project may be favourably considered, under condition that all mitigation and impact management actions provided are implemented

### Impacts on Aquatic Ecology

Based on the Aquatic Ecology Assessment (**Appendix E**) wetland units were largely indirectly associated with the project (outside of the 500 m regulated area) warranting no further ecological assessment of the wetland systems for this project, with emphasis rather afforded to the aquatic assessment of the rivers possibly at risk from the proposed project infrastructure. The aquatic features identified within the study area require a buffer of 50 m and are to be treated as a no-go zone and avoided as far as is feasible. It is the specialist opinion that the project infrastructure does pose a risk to the watercourses. If mitigation measures, recommendations and remedial measures are implemented the risks can be lowered.

### **Impacts on Avifauna**

The entire Project Site is a high sensitivity zone due to the potential presence of several SCC including African Rock Pipit, Black Stork, Blue Crane, Cape Vulture, Greater Flamingo, Karoo Korhaan, Lanner Falcon, Ludwig's Bustard, Martial Eagle, Secretarybird, Tawny Eagle, and Verreaux's Eagle which could utilise the whole Project Site for foraging. However, these species do not require specific avoidance measures at this stage because there is still adequate habitat available outside the Project Site.

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 expected impacts of the Carolus EGI 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 would be reduced to Low negative. No fatal flaws were discovered during 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 Hutton and Oakleaf, with other associated soils also occurring. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low to Moderate" sensitivities. The available climate can limit crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area. The area is not favourable for most cropping practices. Even though there might be negative impacts associated with the construction and operation phases of the EGI, the impacts are of low to medium significance. Low pre- and post-mitigation significance ratings are expected for the construction phase. During the operational phase, the pre-mitigation significance will be medium. If the recommended mitigation measures are to be followed during and after the construction and operation phases the overall impacts can be of acceptable ratings.

### **Impacts on Heritage Resources (Including Archaeology and Palaeontology)**

The results of the archaeological field assessment (refer to **Appendix H**) conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Kruger, 2012). All of the archaeological resources identified within the area proposed for the Carolus Solar PV1 grid connection infrastructure in this field assessment have been determined to be not conservation worthy. As such, these resources have been sufficiently recorded and there is no objection to the proposed development in these locations from

an archaeological perspective. The construction of power lines is not impactful on archaeological sites and the siting of pylons can be made through most of the area without causing significant damage to archaeological sites. The only significant site located in close proximity to the proposed grid alignment is site 014 which is described as "LSA and MSA site with mainly LSA hornfels flakes and pottery". This site has been graded IIIB and a no-development buffer of 100m is recommended around this site.

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and some do contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils. Almond (2010) found no fossils of significance during his site visit to Vetlaagte, and the Wag 'n Bietjie farm has the same lithology. It is unknown what lies below the surface. Based on previous surveys in the area, the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be low to moderate.

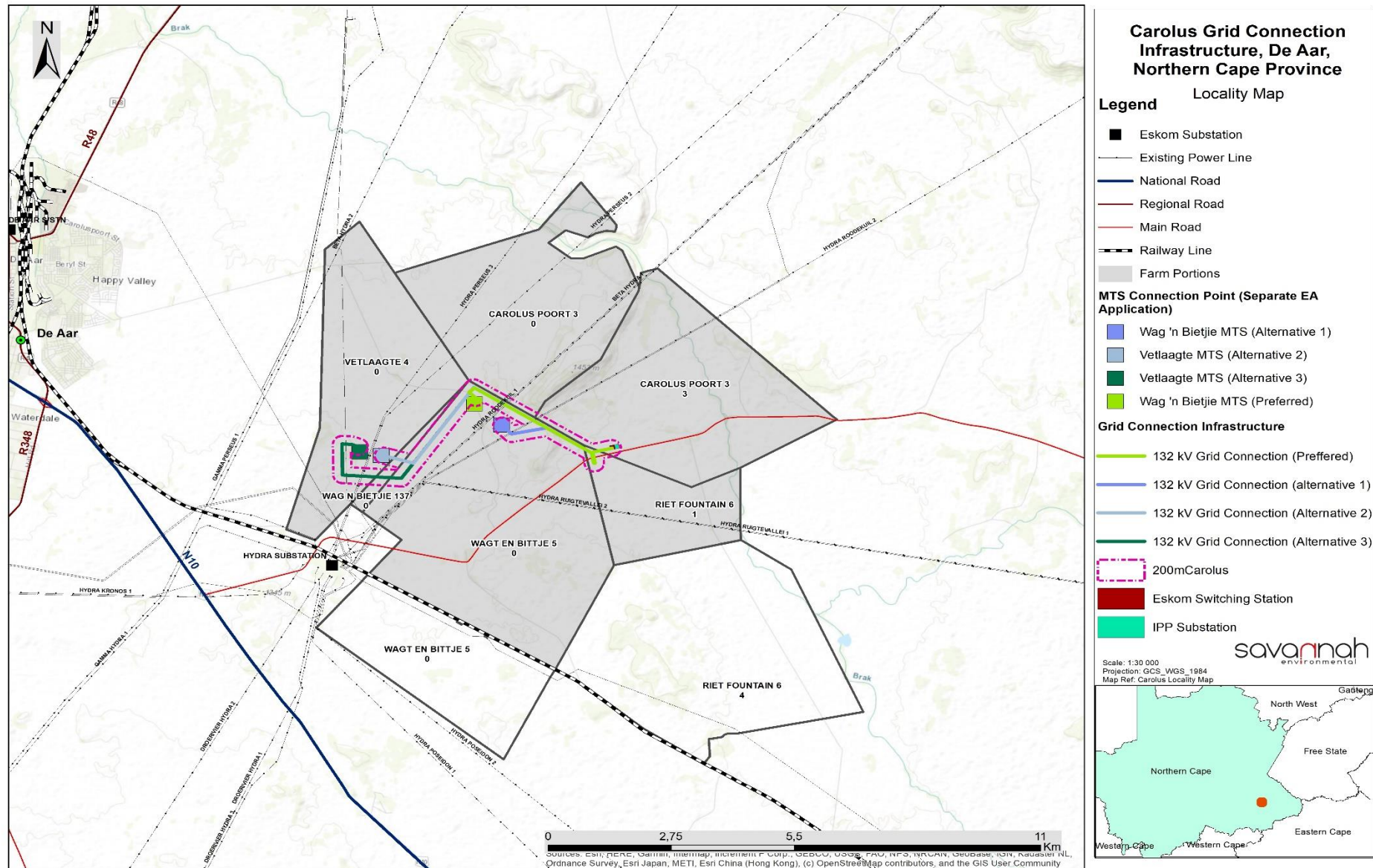
### **Visual Impacts**

The anticipated visual impacts included in the Visual Impact Assessment (**Appendix I**) (i.e. post mitigation impacts) 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.

### **Social Impacts**

The findings of the SIA (**Appendix J**) indicate that the development of the proposed Carolus EGI will create employment and business opportunities for locals in the ELM during both the construction and operational phase of the project. All of the potential negative impacts, with the exception of the impact on sense of place, can also be effectively mitigated.

The significance of this impact is rated as Low Negative with mitigation. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives.



**Figure 1:** Locality map of the project site within which the Carolus EGI is proposed to be developed (refer also to Appendix M)



## DEFINITIONS AND TERMINOLOGY

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**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 if such investigation or feasibility study does not constitute a listed activity or specified activity.

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

**Commissioning:** Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the solar PV infrastructure 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.

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

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

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

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

whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

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

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

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

- i. The land, water, and atmosphere of the earth.
- ii. Micro-organisms, plant, and animal life.
- iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

**Environmental impact:** An action or series of actions that influence the environment.

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

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

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

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

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

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

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

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

**Mitigation hierarchy:** The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities

**No-go areas:** Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

**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).

**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.

## ACRONYMS

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BGIS	Biodiversity Geographic Information System
BOP	Balance of Plant
CBA	Critical Biodiversity Area
DFFE	Department Forestry, Fisheries of the Environment (National)
DWS	Department of Water and Sanitation
CSIR	Council for Scientific and Industrial Research
DM	District Municipality
DMRE	Department of Mineral Resources Energy
EAP	Environmental Assessment Practitioner
EGIS	Environmental Geographic Information System
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
ESA	Ecological Support Area
GA	General Authorisation
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
Km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
M	Metre
m <sup>2</sup>	Square meters
m <sup>3</sup>	Cubic meters
mamsl	Metres Above Mean Sea Level
MW	Megawatts
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)
NEM: WA	National Environmental Management: Waste Act (No. 59 of 2008)
NFA	National Forests Act (No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (No. 25 of 1999)
NT	Near Threatened
NWA	National Water Act (No. 36 of 1998)
ONA	Other Natural Area

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PA	Protected Area
PV	Photovoltaic
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
TOPS	Threatened or Protected Species
VU	Vulnerable

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## CHAPTER 1: INTRODUCTION

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Carolus Solar PV1 (Pty) Ltd is proposing the construction and operation of grid connection infrastructure consisting of a up to 132kV Double circuit power line on Portion 3 of the Farm Carolus Poort No. 3, located approximately 10km east of De Aar, within the Emthanjeni Local Municipality of the Pixley Ka Seme District Municipality in the Northern Cape Province (**Figure 1.1**). The purpose of the Grid Connection Infrastructure (EGI) is to connect the Carolus PV1 Facility (application for environmental authorisation, DFFE Ref.: 14/12/16/3/3/2/2154) to the national grid.

The grid connection infrastructure will consist of the following:

- » Onsite 132kV Eskom switching station - 100m x 100m and 30m height, metering, relay & control buildings, laydown area, ablutions with conservancy tanks and water storage tanks, and access roads which is handed back to Eskom.
- » 132kV Overhead Power Line (OHPL) – 30m height from the switching station to the Main Transmission Substation (MTS) located on Vetlaagte (RE/4) and Wag en Bittjie (RE/5) farms which will be handed back to Eskom (within 300m wide corridor and a 31m wide servitude).
- » Access roads to substation sites (up to 8 m wide) and service tracks (up to 6 m wide) where no existing roads are available.

One corridor of 300m wide and between 4.3km (to Wagt 'n Bietjie MTS) and 7.8km (to Vetlaagte MTS) long are being considered connecting to either the new Vetlaagte MTS located on the Farm Vetlaagte (RE/4) or Wag-n-Bietjie MTS, located on the Farm Wag en Bittjie (RE/5) <sup>1</sup>. The entire extent of the site falls within the Central Corridor of the Strategic Transmission Corridors<sup>2</sup>.

The project is planned as part of a larger cluster of proposed renewable energy projects, which includes four PV facilities (to be known as Fountain Solar PV1, Riet Fountain Solar PV1, Carolus Solar PV1 and Wag Solar PV1), and associated grid connection infrastructure. These projects are proposed by separate Specialist Purpose Vehicles (SPVs) and are assessed through separate Environmental Impact Assessment (EIA) processes. Potential cumulative impacts of the cluster will be assessed in each separate process being undertaken.

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 IPP substation and 132kV double circuit power line and the national electricity grid. The development of the Carolus Solar PV1 Grid Connection Infrastructure 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).

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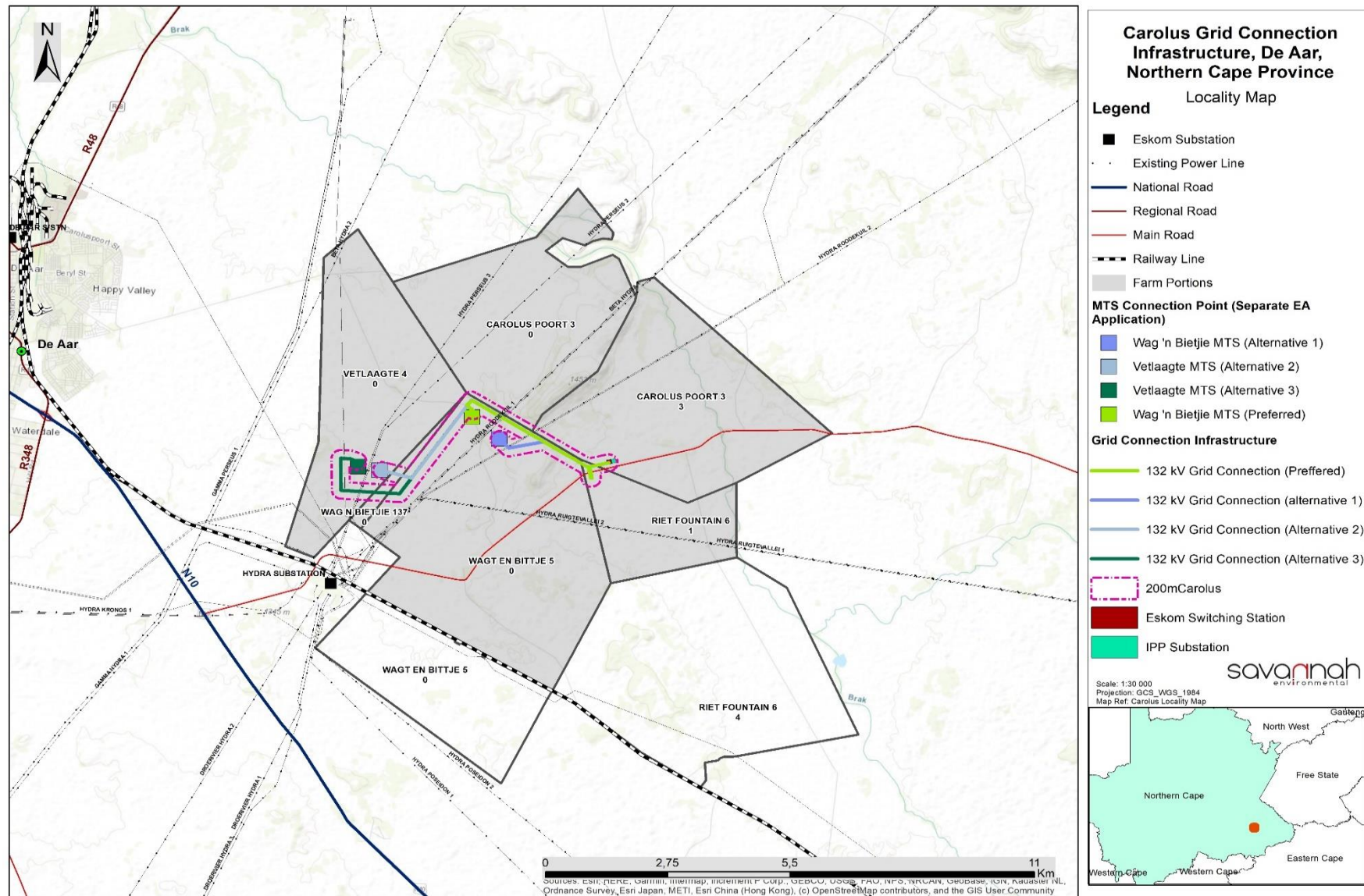
<sup>1</sup> The Vetlaagte MTS and Wag-n-Bietjie MTS are currently being assessed under a separate BAR process.

<sup>2</sup> 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.

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.”*

As all environmental themes listed in the DFFE online screening tool report are high sensitivity (refer to Section 5.4 of this report and Appendix M), the provisions of GNR 2313 published on 27 July 2022 are not applicable. 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 IPP substation and 132kV double circuit power line associated with the Carolus EGI, which are related to the IRP and national energy provision, the Minister is the Competent Authority.



**Figure 1.1:** Locality map showing the Carolus EGI in relation to the closest town of the area

## 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 <b>section 1.3</b> . The curriculum vitae of the EAP, project team and independent specialists are included in <b>Appendix A</b> .
3(b) the location of the activity including (i) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties.	The location of the Fountain EGI is included in <b>section 1.2</b> , <b>Table 1.1</b> , and <b>Figure 1.1</b> . 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 Carolus EGI and the basic assessment process.
- » **Chapter 2** provides a description of the Carolus EGI.
- » **Chapter 3** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed Carolus EGI.
- » **Chapter 4** describes the need and desirability of the Carolus 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 direct, indirect and cumulative impacts associated with the Carolus EGI, 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

Carolus Solar PV1 (Pty) Ltd, is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure (known as Carolus PV1) located on a site approximately 10km east of De Aar within the Emthanjeni Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province. The project is planned as part of a larger cluster of proposed renewable energy projects, which includes two (2) additional up to 250MW and one up to 120MW PV facilities, and associated grid connection infrastructure. These projects are proposed by separate Specialist Purpose Vehicles (SPVs)<sup>3</sup>, and are assessed through separate Environmental Impact Assessment (EIA) processes<sup>4</sup>. The projects will all

<sup>3</sup> The development of the various projects under separate SPVs is in accordance with the DMRE's requirements under the REIPPPP.

<sup>4</sup> The final EIA Reports for the PV facilities have been submitted to DFFE for review and decision-making.

connect to the proposed new Vetlaagte Main Transmission Substation (MTS) or the proposed Wag 'n Bietjie MTS, depending on Eskom requirements.

A preferred project site has been identified by Carolus Solar PV1 (Pty) Ltd as a technically suitable area for the development of the Carolus Solar PV1 facility. The Carolus EGI, which is proposed to connect the Carolus Solar PV1 Facility (application for environmental authorisation, DFFE Ref.: 14/12/16/3/3/2/2154) to the electricity grid, is proposed within the following properties (**Table 1.1**):

- » Portion 1 of the Farm Riet Fountain 6
- » Remainder of the Farm Wagt en Bittje 5
- » Portion 3 of the Farm Carolus Poort 3
- » Portion 0 of the Farm Carolus Poort 3
- » Farm Wag n Bietjie Annex C137
- » Portion 0 of the Farm Vetlaagte 4

Two alternative corridors of 300m wide and between 4.3km (to the Wagt n Bietjie MTS) and 7.8km (to Vetlaagte MTS) long are being considered for the placement of the proposed 132kV double circuit power line, connecting to either the new Vetlaagte MTS located on the Farm Vetlaagte (RE/4) or the preferred Wag-n-Bietjie MTS, located on the Farm Wag en Bittje (RE/5). The Vetlaagte MTS and Wag 'n Bietjie MTS are assessed in a separate BAR process together with the PV facilities. Both the MTS have their own alternatives as well as preferred layout that is being assessed. An 8m wide access road and entrance gate from the public road to the project site and switching station will be established.

The nature and extent of the proposed Carolus 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 Carolus 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 Carolus EGI

<b>Province</b>	<b>Northern Cape Province</b>
<b>District Municipality</b>	Pixley Ka Seme District Municipality
<b>Local Municipality</b>	Emthanjeni Local Municipality
<b>Ward number(s)</b>	Ward 6
<b>Nearest town(s) (measured from the centre of the project site)</b>	De Aar (~10km east)
<b>Affected Properties: Farm name(s), number(s) and portion numbers</b>	<ul style="list-style-type: none"> <li>» Portion 1 of the Farm Riet Fountain 6</li> <li>» Remainder of the Farm Wagt n Bietjie 5</li> <li>» Portion 3 of the Farm Carolus Poort 3</li> <li>» Portion 0 of the Farm Wag n Bietjie 137</li> <li>» Portion 0 of the Farm Vetlaagte 4</li> </ul>
<b>SG 21 Digit Code (s)</b>	<ul style="list-style-type: none"> <li>» Portion 1 of the Farm Riet Fountain 6: C0300000000000600001</li> <li>» Remainder of the Farm Wag 'n Bittje 5: C0300000000000500000</li> </ul>

	<ul style="list-style-type: none"> <li>» Portion 3 of the Farm Carolus Poort 3: C03000000000000300003</li> <li>» Portion 0 of the Farm Wag en Bietjie 137 Annex C: C030000000000013700000</li> <li>» Portion 0 of the Farm Vetlaagte 4: C03000000000000400000</li> </ul>		
<b>Current zoning and Land Use</b>	Agriculture		
<b>Site co-ordinates (centre of grid connection)</b>	30°40'26.63"S; 24°07'13.97"E		
<b>Coordinates of the power line corridor and the IPP substation</b>	<b>IPP Substation Coordinates</b>		
	<b>Portion 3 of the Farm Carolus Poort No. 3</b>	<b>Lat</b>	<b>Long</b>
		<b>Centre Coordinates</b>	
		30°41'07.99"S	24°09'15.63"E
		<b>Corner Coordinates</b>	
		30°41'06.86"S	24°09'13.38"E
		30°41'05.99"S	24°09'17.01"E
		30°41'09.14"S	24°09'17.98"E
	30°41'09.97"S	24°09'14.34"E	
	<b>Grid Corridor to the Wag en Bittje MTS Coordinates</b>		
	<b>Point</b>	<b>Latitude</b>	<b>Longitude</b>
	Start Point	30°41'09.54"S	24°09'11.58"E
	Middle Point	30°40'49.92"S	24°08'03.97"E
	End Point	30°40'33.58"S	24°07'15.27"E
	<b>Grid Corridor to the Vetlaagte MTS Coordinates</b>		
	<b>Point</b>	<b>Latitude</b>	<b>Longitude</b>
	Start Point	30°41'09.54"S	24°09'11.58"E
	Middle Point	30°40'51.00"S	24°06'54.21"E
	End Point	30°41'16.90"S	24°05'39.97"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), Fountain Solar PV1 (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 Grid Connection Infrastructure on Portion 3 of the Farm Carolus Poort No. 3. Neither Savannah Environmental nor any of its specialists are subsidiaries of, or are affiliated Carolus Solar PV1 (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.

- » **Debbie-Lee Janse van Rensburg**, junior author of this report and EAP of this project, holds a Bachelor of Arts in Psychology, Geography and Environmental Management and a BSc. Honors degree in Environmental Science from the North West University. Her key focus is on undertaking environmental authorisation applications, environmental permitting, public participation, environmental impact assessments, and GIS mapping.
- » **Nkhensani Masondo**, the principle author of this report and EAP on this project is registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA (2020/1385) and holds a BSocSci in Environmental Analysis and Management and is currently completing her MSc in Environmental Management. She has six (6) years of working experience in the environmental field and has gained extensive experience in conducting Environmental Impact Assessments, Stakeholder Engagements, Environmental Auditing and Environmental Management Plans Programmes for a wide range of projects. She is responsible for overall compilation of the report, this includes reviewing specialists reports and incorporating specialist studies into the Basic Assessment report and its associated Environmental Management.
- » **Jo-Anne Thomas**, 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 Carolus EGI, the following specialist consultants have provided input into this BA Report:

Specialist	Area of Expertise
Andrew Husted of The Biodiversity Company	Ecology, Freshwater, and Soils
Chris van Rooyen and Albert Froneman	Avifauna

<b>Specialist</b>	<b>Area of Expertise</b>
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 Landscape)

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 Carolus 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 <b>Chapter 2, Table 2.1</b> , as well as <b>section 2.2.1</b> 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 Carolus EGI is included as <b>Figure 2.1</b> .
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 <b>Table 2.1</b> and <b>Table 2.2</b> .
3(g) a motivation for the preferred site, activity and technology alternative	The identification and motivation for the preferred project site and power line corridor, the proposed activity and the proposed technology is included in <b>sections 2.4.1</b> and <b>2.4.2</b> .
3(h)(i) details of the alternative considered	The details of all alternatives considered as part of the project are included in sections <b>2.4.1 – 2.4.4</b> .
3(h)(ix) the outcome of the site selection matrix	The site selection process followed by the developer in order to identify the Carolus EGI is described in <b>section 2.4.1</b> .
3(h)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such	Where no alternatives have been considered, motivation has been included in <b>section 2.4</b> .

## 2.2 Nature and extent of the Great Pixley Park (Carolus) Grid Connection Infrastructure

Carolus Solar PV1 (Pty) Ltd is proposing the construction and operation of grid connection infrastructure consisting of a up to 132kV Double circuit power line on Portion 3 of the Farm Carolus Poort No. 3, near De Aar, within the Emthanjeni Local Municipality of the Pixley Ka Seme District Municipality in the Northern Cape Province (**Figure 2.1**). The EGI will connect to either the new Vetlaagte MTS or the new Wag-n-Bietjie MTS. The development of the infrastructure will enable the evacuation of electricity from the Carolus Solar PV 1 Facility (application for environmental authorisation in process, DFFE Ref.: 14/12/16/3/3/2/2154) located on Portion 3 of Farm Carolus Poort No 3<sup>5</sup> to the national grid at the either the new Vetlaagte MTS or the new Wag-n-Bietjie MTS. The EGI will consist of the following:

- » Onsite 132kV Eskom switching station - 100m x 100m and 30m height, metering, relay & control buildings, laydown area, ablutions with conservancy tanks and water storage tanks, and access roads which is handed back to Eskom.
- » 132kV Overhead Power Line (OHPL) – 30m height from the switching station to the Main Transmission Substation (MTS) located on Vetlaagte (RE/4) Wag en Bittje (RE/5) farms which will be handed back to Eskom (within 300m wide corridor and a 31m wide servitude).
- » Access roads to substation sites (up to 8 m wide) and service tracks (up to 6 m wide) where no existing roads are available.

One corridor of 300m wide and between 4.3km (to Wagt 'n Bietjie MTS) and 7.8km (to Vetlaagte MTS) long is being considered connecting to either the new Vetlaagte MTS located on the Farm Vetlaagte (RE/4) or Wag-n-Bietjie MTS, located on the Farm Wag en Bittje (RE/5).

### 2.2.1. Overview of the Project Site

The project is to be developed on a site located approximately 10km east of De Aar in the Northern Cape Province. The project site falls within Ward 6 of the Emthanjeni Local Municipality of the Pixley Ka Seme District Municipality in the Northern Cape Province. The entire extent of the site is located within the Central Corridor of the Strategic Transmission Corridors. The 132kV IPP substation, is proposed on Portion 3 of the Farm Carolus Poort No.3. The following affected properties are traversed by the grid corridor:

- » Portion 1 of the Farm Riet Fountain 6
- » Remainder of the Farm Wag ten Bittje 5
- » Portion 3 of the Farm Carolus Poort 3
- » Portion 0 of the Farm Wag n Bietjie 137 Annex C
- » Portion 0 of the Farm Vetlaagte 4

The project site can be accessed via the N10 which lies west of the development area (refer to **Figure 2.1**), and then via the existing public road (Hydra Substation access road) which cuts across the larger cluster's development footprint and provides access to the project site and development area (refer to **Figure 2.2**).

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<sup>5</sup> The Fountain Solar PV 1 Facility is currently in process of an environmental authorisation (DFFE Ref.: 14/12/16/3/3/2/2154)

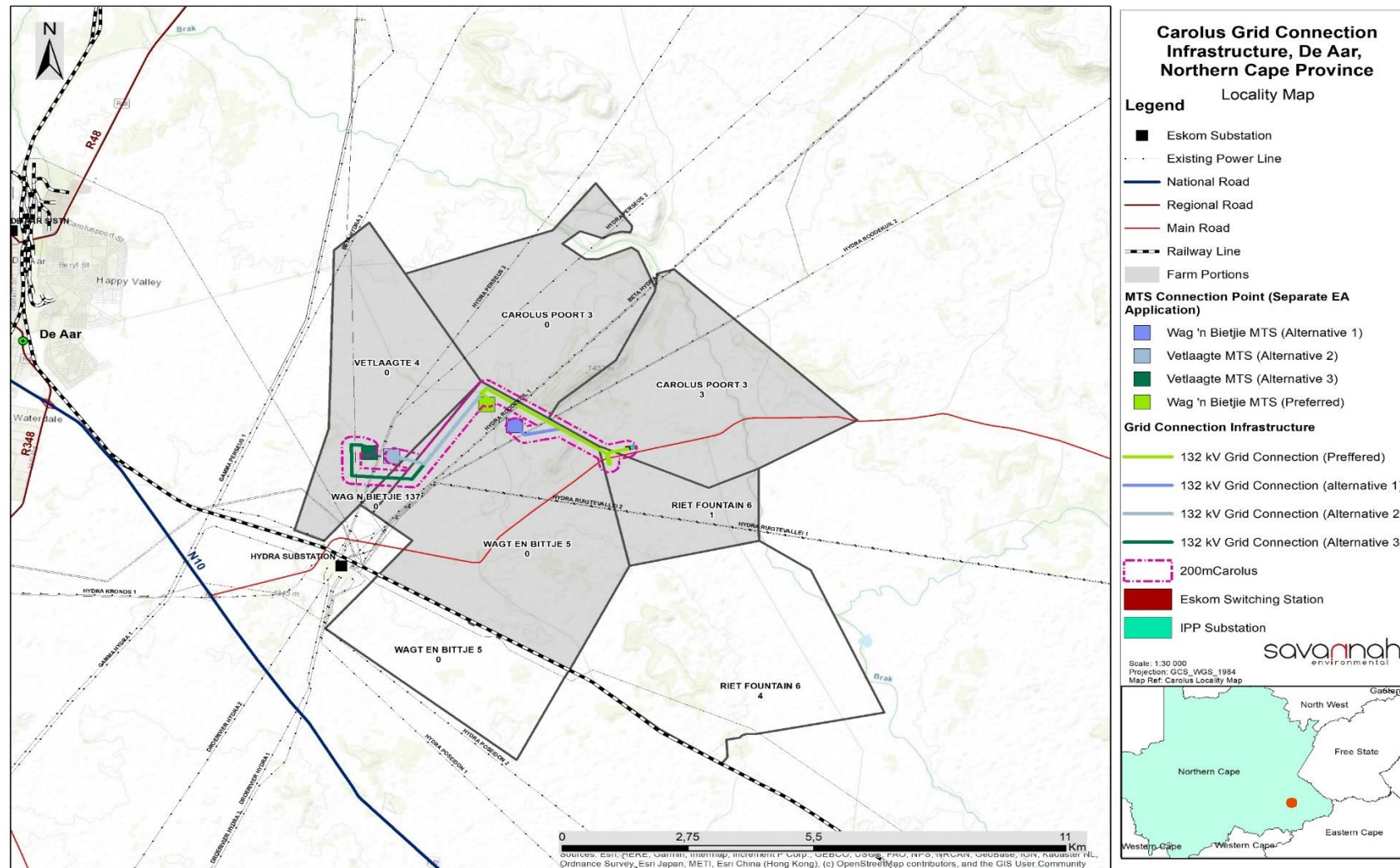
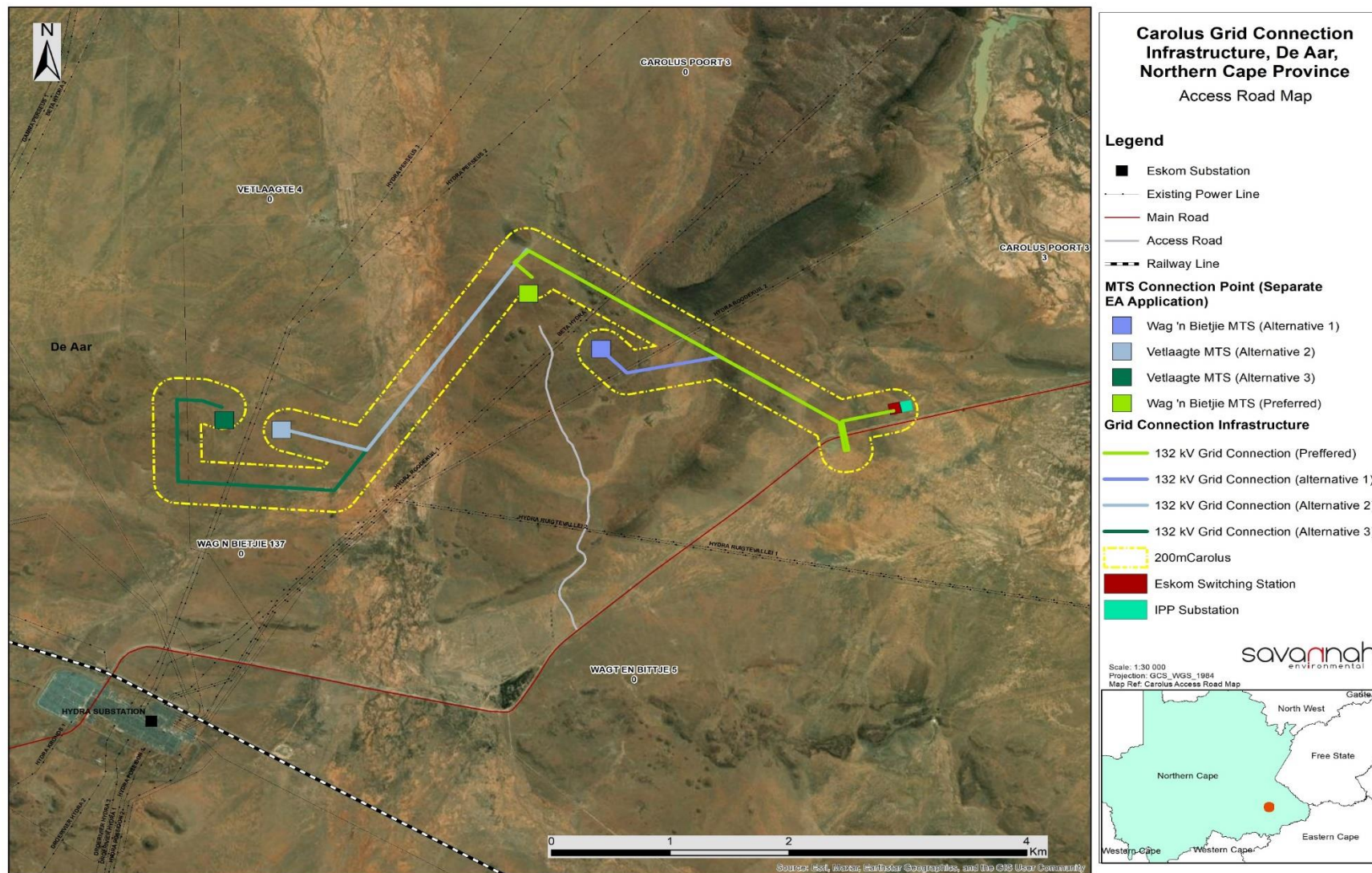


Figure 2.1: Locality map Carolus EGI



**Figure 2.2:** Location of the Carolus 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 Carolus 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 Carolus EGI

Infrastructure	Footprint and dimensions																																															
Capacity of the central collector substation	120MVA at 132kV																																															
Corridor width (for assessment purposes)	The grid connection corridor is up to 300m wide and 4.3km and 7.8km in length to allow for avoidance of environmental sensitivities, and suitable placement of the 132kV (double circuit) overhead power line within the corridor																																															
Capacity and circuit of the power line	132kV (double circuit)																																															
Power line servitude width	Up to 31m																																															
Length of the grid connection corridor	Alternative connecting to Wag-n-Bietjie MTS: 4.3km Two alternatives connecting to Vetlaagte MTS: 7.8km																																															
Height of the power line towers (pylons)	Up to 30m																																															
Access road	An 8m wide access road and entrance gate to the project site and switching station is planned as part of the development. The developer has additionally made provision for 6m wide internal distribution roads.																																															
A description and coordinates of the corridor in which the proposed activity or activities is to be undertaken	<table border="1"> <thead> <tr> <th colspan="3">IPP Substation Coordinates</th> </tr> <tr> <th rowspan="8">Portion 3 of the Farm Carolus Poort No. 3</th> <th>Lat</th> <th>Long</th> </tr> <tr> <th colspan="2">Centre Coordinates</th> </tr> <tr> <td>30°42'52.64"S</td> <td>24°09'17.88"E</td> </tr> <tr> <th colspan="2">Corner Coordinates</th> </tr> <tr> <td>30°42'50.43"S</td> <td>24°09'17.20"E</td> </tr> <tr> <td>30°42'51.89"S</td> <td>24°09'20.54"E</td> </tr> <tr> <td>30°42'54.77"S</td> <td>24°09'18.88"E</td> </tr> <tr> <td>30°42'53.27"S</td> <td>24°09'15.51"E</td> </tr> </thead></table> <table border="1"> <thead> <tr> <th colspan="3">Grid Corridor to the Wag en Bittje MTS</th> </tr> <tr> <th>Point</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr> <td>Start Point</td> <td>30°42'49.70"S</td> <td>24°09'19.65"E</td> </tr> <tr> <td>Middle Point</td> <td>30°41'13.84"S</td> <td>24°08'55.87"E</td> </tr> <tr> <td>End Point</td> <td>30°40'34.13"S</td> <td>24°07'15.14"E</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="3">Grid Corridor to the Vetlaagte MTS Coordinates</th> </tr> <tr> <th>Point</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr> <td>Start Point</td> <td>30°42'49.70"S</td> <td>24°09'19.65"E</td> </tr> <tr> <td>Middle Point</td> <td>30°40'25.01"S</td> <td>24°07'13.13"E</td> </tr> </tbody> </table>	IPP Substation Coordinates			Portion 3 of the Farm Carolus Poort No. 3	Lat	Long	Centre Coordinates		30°42'52.64"S	24°09'17.88"E	Corner Coordinates		30°42'50.43"S	24°09'17.20"E	30°42'51.89"S	24°09'20.54"E	30°42'54.77"S	24°09'18.88"E	30°42'53.27"S	24°09'15.51"E	Grid Corridor to the Wag en Bittje MTS			Point	Latitude	Longitude	Start Point	30°42'49.70"S	24°09'19.65"E	Middle Point	30°41'13.84"S	24°08'55.87"E	End Point	30°40'34.13"S	24°07'15.14"E	Grid Corridor to the Vetlaagte MTS Coordinates			Point	Latitude	Longitude	Start Point	30°42'49.70"S	24°09'19.65"E	Middle Point	30°40'25.01"S	24°07'13.13"E
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Substation coordinates (approximate centre point and corner points)																																																

Infrastructure	Footprint and dimensions		
	End Point	30°41'17.50"S	24°05'39.56"E



### 2.2.3 Project Development Phases associated with the Carolus Grid Connection Infrastructure

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

<b>Construction Phase</b>	
<b>Requirements</b>	<ul style="list-style-type: none"> <li>» Duration of the construction phase is expected to be 12 -18 months.</li> <li>» Create direct construction employment opportunities. Approximately up to 50 employment opportunities will be created during the construction phase.</li> <li>» No on-site labour camps. Employees to be accommodated in the nearby town such as De Aar and transported to and from site on a daily basis.</li> <li>» Overnight on-site worker presence would be limited to security staff.</li> <li>» 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.</li> <li>» Electricity required for construction activities will be generated by a generator. Where low voltage connections are possible, these will be considered.</li> <li>» 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.</li> </ul>
<b>Construction sequence</b>	<p>The following simplified sequence is conducted for the construction of the substation:</p> <ul style="list-style-type: none"> <li>» Step 1: Conduct geotechnical investigations to determine founding conditions;</li> <li>» Step 2: Conduct site survey;</li> <li>» Step 3: Vegetation clearance and construction of access road;</li> <li>» Step 4: Site grading and levelling;</li> <li>» Step 5: Construction of foundations;</li> <li>» Step 6: Import of collector substation components;</li> <li>» Step 7: Construction of collector substation;</li> <li>» Step 8: Rehabilitation of disturbed area and protection of erosion sensitive areas; and</li> <li>» Step 9: Testing (including quality control) and commissioning (in consultation with the switching specialist).</li> </ul> <p>Overhead power lines are constructed in the following simplified sequence:</p> <ul style="list-style-type: none"> <li>» Step 1: Surveying of the development corridor and negotiating with affected landowners;</li> <li>» 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 &amp; WUL/GA);</li> </ul>

	<ul style="list-style-type: none"> <li>» Step 3: Vegetation clearance and construction of access roads/tracks (where required);</li> <li>» Step 4: Construction of tower foundations;</li> <li>» Step 5: Assembly and erection of infrastructure within and along the corridor;</li> <li>» Step 6: Stringing of conductors;</li> <li>» Step 7: Rehabilitation of disturbed areas; and</li> <li>» Step 8: Continued maintenance.</li> </ul>
<b>Activities to be undertaken</b>	
Conduct surveys prior to construction	<ul style="list-style-type: none"> <li>» Including, but not limited to a geotechnical survey, site survey (including the location of the 132kV IPP substation and power line servitude) and all other associated infrastructure.</li> <li>» 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.</li> </ul>
Establishment of access roads	<ul style="list-style-type: none"> <li>» An access road/track will be established along the power line servitude for construction and/or maintenance activities required.</li> <li>» 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.</li> </ul>
Undertake site preparation	<ul style="list-style-type: none"> <li>» 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.</li> <li>» 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.</li> </ul>
Establishment of laydown areas and batching plant on site	<ul style="list-style-type: none"> <li>» A laydown area/s for the storage of grid infrastructure and substation components, including the civil engineering construction equipment.</li> <li>» The laydown area will also accommodate building materials and equipment associated with the construction of buildings.</li> <li>» No borrow pits will be required. Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas.</li> <li>» A temporary concrete batching plant of 50m x 50m in extent to facilitate the concrete requirements for infrastructure foundations.</li> </ul>
Undertake site rehabilitation	<ul style="list-style-type: none"> <li>» Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed.</li> <li>» On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.</li> </ul>
<b><u>Operation Phase</u></b>	
<ul style="list-style-type: none"> <li>» Duration will be 20-25 years, or longer as needed for the operation of the Carolus Solar PV 1 Facility (<a href="#">DFFE Ref.: 14/12/16/3/3/2/2154</a>).</li> <li>» Requirements for security and maintenance of the infrastructure.</li> <li>» Employment opportunities relating mainly to operation activities and maintenance. Very limited employment opportunities will be available.</li> <li>» Current land-use activities, i.e., livestock farming, can continue in the areas adjacent to the infrastructure.</li> </ul>	

<b>Activities to be undertaken</b>	
Operation and Maintenance	<ul style="list-style-type: none"> <li>» Ad hoc infrastructure maintenance activities. Once built, the power line and 132kV switching station will likely be ceded to Eskom, and it will be Eskom's full-time employees undertaking maintenance.</li> <li>» Disposal of waste products (e.g., oil) in accordance with relevant waste management legislation.</li> <li>» On-going rehabilitation of those areas which were disturbed during the construction phase.</li> <li>» During the operation phase, vegetation around the 132kV switching station and within the power line servitude will require management only if it impacts on the safety and operational objectives of the project.</li> <li>» The maintenance of the grid connection infrastructure will be the responsibility of the holder of the Environmental Authorisation.</li> </ul>
<b><u>Decommissioning Phase</u></b>	
<b>Requirements</b>	<ul style="list-style-type: none"> <li>» Decommissioning of the grid connection infrastructure at the end of its economic life cycle and that of the Carolus Solar PV 1 Facility (<u>DFFE Ref.: 14/12/16/3/3/2/2154</u>).</li> <li>» Expected lifespan of approximately 20 – 25 years (with maintenance) before decommissioning is required.</li> <li>» Decommissioning activities, if ultimately required, are to comply with the legislation relevant at the time.</li> </ul>
<b>Activities to be undertaken</b>	
Site preparation	<ul style="list-style-type: none"> <li>» Confirming the integrity of access to the grid connection infrastructure to accommodate the required equipment.</li> <li>» Mobilisation of decommissioning equipment.</li> </ul>
Disassemble components and rehabilitation	<ul style="list-style-type: none"> <li>» The power line and 132kV switching station infrastructure components will be disassembled and reused and recycled (where possible).</li> <li>» Where components cannot be reused or recycled, these will be disposed of in accordance with the regulatory requirements at the time of decommissioning.</li> <li>» 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.</li> </ul>

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 Carolus 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 Carolus EGI, which is proposed to enable grid connection for the evacuation of the electricity to the national grid from the Carolus Solar PV1 Facility (application for environmental authorisation in process, DFFE Ref.: 14/12/16/3/3/2/2154).

### 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)<sup>6</sup>, 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 Carolus EGI will enable the evacuation of the generated electricity from the Carolus Solar PV1 PV Facility (DFFE Ref.: 14/12/16/3/3/2/2154) 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.

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<sup>6</sup> The Integrated Resource Plan (IRP) is a legislated policy which regulates power generation planning.

- » The operational aspects of the activity.

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 Carolus EGI. 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 Carolus EGI**

### **2.4.1 Location Alternatives**

Carolus Solar PV1 (Pty) Ltd, as the proponent for the Carolus EGI, identified one technically feasible location for the 132kV Eskom switching station, dependent on the layout of the Carolus Solar PV1 Facility ([DFFE Ref.: 14/12/16/3/3/2/2154](#)), and one grid connection corridor for consideration in the BA process, dependent on the MTS connection point to the national grid. The grid connection corridor and footprint for the switching station are considered highly suitable from a technical perspective for development as they enable the connection of the renewable energy facility to the national grid. Specific characteristics considered in identifying a suitable grid connection corridor and a footprint for the switching station, and the results thereof, are discussed in the sections below.

- » **Land Availability, Location and Land Use** – In order to develop the Carolus EGI, sufficient space and access to land between the 132kV Eskom switching station and the new Vetlaagte MTS or the new Wag-n-Bietjie MTS is required. The properties traversed by the grid connection corridor and within which the Eskom switching station 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 topography in the wider area surrounding the project site is characterised by a largely flat to undulating landscape interspersed with areas of high elevation in the form of hills, koppies, ridges and/or mountains. In the wider area, a range of hilly/mountainous topography with high elevations is present to the south-east and north of the site, respectively. As such, there are very few physical constraints present which would influence the construction and operation of the EGI.
- » **Existing Infrastructure** – The availability of existing road and grid connection infrastructure was considered by the developer in determining the location of the Carolus Solar PV1 Facility and associated Carolus EGI as this will facilitate 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 N10 considered as highly beneficial.

» **Consideration of sensitive environmental features** – The location of the switching station was informed by environmental sensitivities within the development area for the Carolus Solar PV1 Facility (DFFE Ref.: [14/12/16/3/3/2/2154](#)) as determined through the EIA process undertaken for the PV facility. Through the assessment of the 300m wide grid connection corridor between 4.3km to 7.8km in extent for the placement of the power line, which is much larger than the area required for the servitude of up to 31m, an opportunity is created by the proponent for the avoidance of sensitive environmental features and areas, thereby ensuring that the Carolus 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 31m wide servitude for the Carolus 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 switching station and a 132kV double circuit power line is linked to the grid connection infrastructure required to evacuate the generated renewable electricity from the Carolus Solar PV1 Facility (DFFE Ref.: [14/12/16/3/3/2/2154](#)). The activity is therefore specific to the technical requirements of the proposed renewable energy facility. The development of the Carolus EGI is considered to be the most appropriate and efficient solution for the evacuation of the generated electricity from the Carolus Solar PV1 Facility 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 switching station and a 132kV double circuit power line, connecting to the national grid via the existing new Vetlaagte MTS or the new Wag 'n Bietjie MTS. Given that the location of the switching station was informed by environmental sensitivities within the development area for the Carolus Solar PV1 Facility (DFFE Ref.: [14/12/16/3/3/2/2154](#)) 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 300m wide and between 4.3km and 7.8km in length (depending on the MTS connection point), 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 Carolus Solar PV1 (Pty) Ltd not constructing the Carolus 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 Carolus 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 Carolus 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 desirability 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 Carolus EGI is regarded as essential infrastructure for the evacuation of electricity from the proposed Carolus Solar PV1 Facility (DFFE Ref.: 14/12/16/3/3/2/2154) 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 Carolus 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:

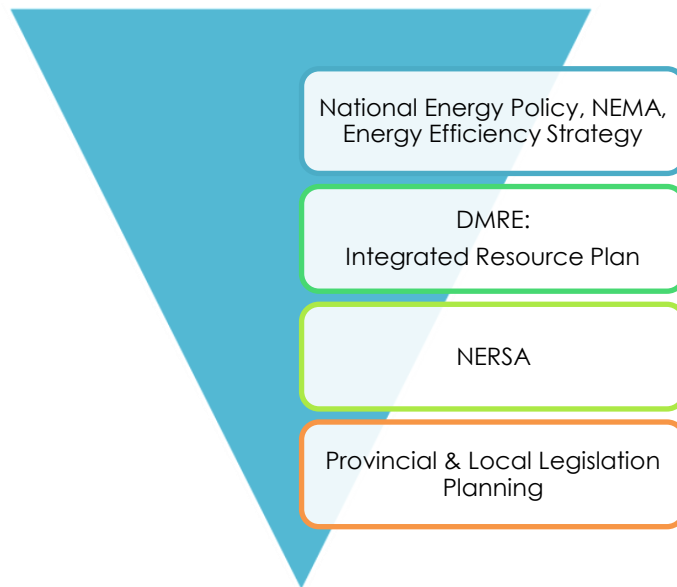
Requirement	Relevant Section
<p>3(e) a description of the policy and legislative context within which the development is proposed including-</p> <ul style="list-style-type: none"> <li>(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report.</li> <li>(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.</li> </ul>	<p>A description of the policy and legislative context within which the Carolus EGI is proposed is included and considered within this chapter.</p>

### 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 solar PV 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 solar PV 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. 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).
- » **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.

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.

At the **Local Level**, the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape Province, both the local and district municipalities play a role. The local municipality includes the **Emthanjeni Local Municipality** which forms part of the **Pixley Ka Seme District Municipality**

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 Carolus EGI (and the renewable energy facility it will cater for) are provided below in **Table 3.1**. The Carolus 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 Carolus EGI

Relevant policy	Relevance to the Carolus EGI
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	<p>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.</p> <p>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.</p>

Relevant policy	Relevance to the Carolus EGI
	<p>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.</p> <p>The 26<sup>th</sup> COP was held in Glasgow from 31 October to 12 November 2021. From this conference, 137 countries made a commitment to “halt 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.</p> <p>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.</p> <p>The policy provides support for the Carolus Solar PV1 Facility that the Carolus 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.</p>
<p>The Equator Principles IV (October 2020)</p>	<p>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 Pixley Park cluster energy facilities and the proposed Pixley Park Grid Connection Infrastructure) and apply globally to all industry sectors.</p> <p>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.</p> <p>The Carolus EGI 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.</p>
<p>International Finance Corporation (IFC) Performance Standards and Environmental and Social Sustainability (January 2012)</p>	<p>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.</p>

Relevant policy	Relevance to the Carolus EGI
	<p>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.</p> <p>Given the nature of the Carolus 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.</p>

### 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 the Carolus 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 Carolus EGI

Relevant legislation or policy	Relevance to the Carolus EGI
Constitution of the Republic of South Africa, 1996	<p>Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development, and use of natural resources while promoting justifiable economic and social development.</p> <p>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.</p>
National Environmental Management Act (No. 107 of 1998) (NEMA)	<p>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.</p> <p>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.</p>

Relevant legislation or policy	Relevance to the Carolus EGI
	<p>The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within the NEMA.</p> <p>The Carolus EGI 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 NEMA. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.</p>
National Energy Act (No. 34 of 2008)	<p>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.</p> <p>The Act provides the legal framework which supports the development of power generation facilities, and the required associated grid infrastructure, such as the Carolus EGI.</p>
White Paper on the Energy Policy of the Republic of South Africa (1998)	<p>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.</p> <p>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 unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.</p>
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	<p>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.</p> <p>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.</p>
The Electricity Regulation Act (No. of 2006)	<p>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</p>

Relevant legislation or policy	Relevance to the Carolus EGI
	<p>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.</p>
<p>National Development Plan 2030</p>	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>» 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.</li> <li>» Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households.</li> <li>» Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.</li> </ul> <p>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.</p> <p>The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of the Carolus Solar PV1 facility which the Carolus 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.</p>
<p>Integrated Energy Plan (IEP), November 2016</p>	<p>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:</p> <ul style="list-style-type: none"> <li>» To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.</li> <li>» 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).</li> <li>» To guide investment in and the development of energy infrastructure in South Africa.</li> <li>» 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.</li> </ul> <p>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</p>

Relevant legislation or policy	Relevance to the Carolus EGI
	<p>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.</p> <p>The 8 key objectives of the integrated energy planning process are as follows:</p> <ul style="list-style-type: none"> <li>» Objective 1: Ensure security of supply.</li> <li>» Objective 2: Minimise the cost of energy.</li> <li>» Objective 3: Promote the creation of jobs and localisation.</li> <li>» Objective 4: Minimise negative environmental impacts from the energy sector.</li> <li>» Objective 5: Promote the conservation of water.</li> <li>» Objective 6: Diversify supply sources and primary sources of energy.</li> <li>» Objective 7: Promote energy efficiency in the economy.</li> <li>» Objective 8: Increase access to modern energy.</li> </ul>
<p>Integrated Resource Plan for Electricity (IRP) 2010-2030</p>	<p>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.</p> <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>» 6 442MW of electricity had been procured from 112 Renewable Energy Independent Power Producers (IPPs) in seven bid rounds<sup>7</sup>.</li> <li>» 5 078MW of electricity generation capacity from 79 IPP projects has been connected to the national grid.</li> <li>» 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.</li> </ul> <p>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. Bid window 6 of the REIPPPP is currently underway with bid submission scheduled for October 2022.</p>

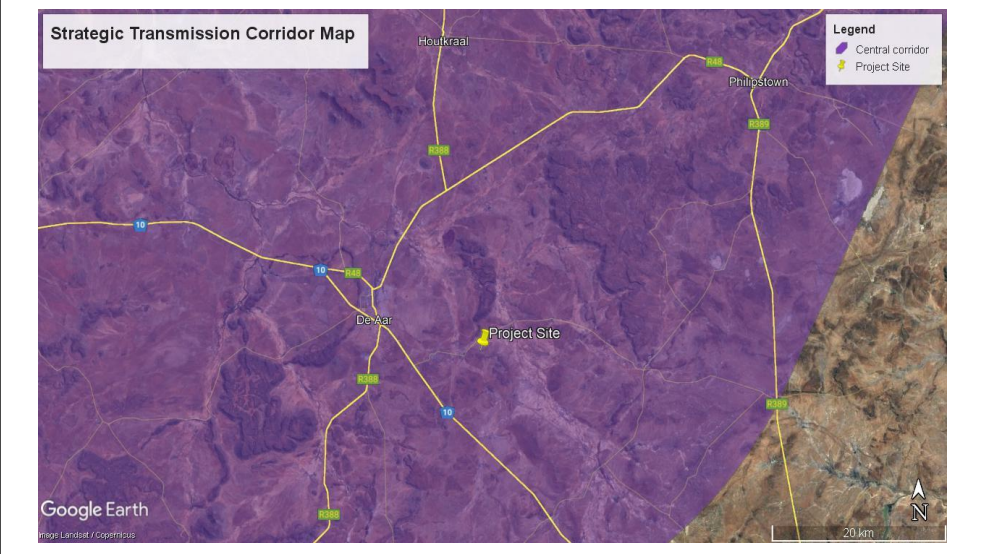
<sup>7</sup> Bid windows 1, 2, 3, 3.5, 4 and small BW1(1S2) and small BW2(2S2).

Relevant legislation or policy	Relevance to the Carolus EGI
New Growth Path (NGP) Framework, 23 November 2010	<p>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.</p> <p>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.</p>
National Climate Change Bill, 2018	<p>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.</p> <p>The development of the Carolus Solar PV1 facility (that forms part of the Pixley Park Solar Cluster Project) and the evacuation of the electricity (through the Carolus EGI) would not result in the generation or release of emissions during its operation.</p>
National Climate Change Response Policy, 2011	<p>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.</p> <p>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.</p> <p>The development of the proposed Carolus Solar PV1 facility (that forms part of the Pixley Park Solar Cluster Project), 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.</p>
National Climate Change Response Strategy for South Africa, 2004	<p>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</p>



Relevant legislation or policy	Relevance to the Carolus EGI
	<p>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.</p> <p>A number of principles and factors guided the conception of the strategy and are required to be implemented. These are:</p> <ul style="list-style-type: none"> <li>» 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.</li> <li>» Ensuring alignment with the need to consistently use locally available resources.</li> <li>» Ensuring compliance with international obligations.</li> <li>» 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.</li> <li>» Focussing on those areas that promote sustainable development.</li> <li>» Promoting programmes that will build capacity, raise awareness, and improve education in climate change issues.</li> <li>» Encouraging programmes that will harness existing national technological competencies.</li> <li>» Reviewing the strategy constantly in the light of national priorities and international trends.</li> <li>» Recognizing that South Africa's emissions will continue to increase as development is realised.</li> </ul> <p>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.</p>
Climate Change Bill	<p>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.</p> <p>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.</p> <p>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 addresses the matters relating</p>

Relevant legislation or policy	Relevance to the Carolus EGI
	<p>to, the national adaptation to impacts of climate change, greenhouse gas emissions and removals, and policy alignment and institutional arrangements.</p> <p>The objects of the proposed Act are to:</p> <ul style="list-style-type: none"> <li>» 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;</li> <li>» 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</li> <li>» 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.</li> </ul> <p>The Bill was introduced to Parliament by the Minister of Forestry, Fisheries and the Environment on 18 February 2022.</p>
Strategic Integrated Projects (SIPs)	<p>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 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 Carolus EGI:</p> <ul style="list-style-type: none"> <li>» 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.</li> <li>» 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.</li> <li>» SIP10: Electricity transmission and distribution for all: the development of the Carolus EGI will enable the evacuation of renewable energy to the national grid.</li> </ul>
Strategic Transmission Corridors (GNR 113 of February 2018)	<p>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 Carolus EGI is located within the Central Strategic Transmission Corridor (<b>Figure 3.2.</b>).</p>

Relevant legislation or policy	Relevance to the Carolus EGI
	 <p><b>Figure 3.2:</b> Location of the project site within the Central Strategic Transmission corridor (shown in purple)</p> <p>As all environmental themes listed in the DFFE online screening tool report are high sensitivity (refer to Section 5.4 of this report and <b>Appendix N</b>, the provisions of GNR 2313 published on 27 July 2022 are not applicable. 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 IPP substation and 132kV double circuit power line associated with the Carolus EGI, which are related to the IRP and national energy provision, the Minister is the Competent Authority.</p>

### 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 Carolus 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 Carolus EGI

Relevant policy	Relevance to the Carolus EGI
Northern Cape Provincial Spatial Development Framework (PSDF) 2012	<p>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.</p> <p>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</p>

Relevant policy	Relevance to the Carolus EGI
	<p>utilisation of solar energy) are to comprise 25% of the province's energy generation capacity by 2020.</p> <p>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.</p> <p>The development of the Carolus EGI for the evacuation of the renewable energy from the Carolus Solar PV1 Facility falls within the overall energy objective for the province.</p>
<p>Northern Cape Provincial Spatial Development Framework (PSDF) 2018 Review - Executive Summary</p>	<p>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.</p> <p>The Spatial Development Strategy identified in the PSDF for basic infrastructure includes achieving the provision of green infrastructure which includes renewable energy.</p> <p>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.</p> <p>The development of the Carolus EGI and the renewable energy facility 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.</p>
<p>Northern Cape Provincial Growth and Development Strategy</p>	<p>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:</p> <ul style="list-style-type: none"> <li>» Agriculture and Agro-processing.</li> </ul>

Relevant policy	Relevance to the Carolus EGI
	<ul style="list-style-type: none"> <li>» Fishing and Mariculture.</li> <li>» Mining and mineral processing.</li> <li>» Transport.</li> <li>» Manufacturing.</li> <li>» Tourism.</li> </ul> <p>However, the NCPGDS also notes that economic development in these sectors also requires:</p> <ul style="list-style-type: none"> <li>» Creating opportunities for lifelong learning.</li> <li>» Improving the skills of the labour force to increase productivity.</li> <li>» Increasing accessibility to knowledge and information.</li> </ul> <p>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:</p> <ul style="list-style-type: none"> <li>» Developing requisite levels of human and social capital.</li> <li>» Improving the efficiency and effectiveness of governance and other development institutions.</li> <li>» Enhancing infrastructure for economic growth and social development.</li> </ul> <p>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.</p> <p>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.</p>

Relevant policy	Relevance to the Carolus EGI
<p>The Northern Cape Climate Change Response Strategy</p>	<p>The development of the Carolus 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.</p> <p>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: <i>"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 events such as flooding and wildfire, with heightened requirements for effective disaster management"</i>.</p> <p>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.</p> <p>Since the Carolus EGI will serve as a grid connection solution for the proposed Carolus Solar PV1 Facility, which will indirectly assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape.</p>
<p>Northern Cape Province Green Document</p>	<p>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</p>

Relevant policy	Relevance to the Carolus EGI
	<p>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.</p> <p>The development of the Carolus EGI will contribute towards further socio-economic upliftment in the Northern Cape Province.</p>
<p>Northern Cape Critical Biodiversity Area (CBA) Map (2016)</p>	<p>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:</p> <ul style="list-style-type: none"> <li>» Protected</li> <li>» Critical Biodiversity Area One (Irreplaceable Areas)</li> <li>» Critical Biodiversity Area Two (Important Areas)</li> <li>» Ecological Support Area</li> <li>» Other Natural Area</li> </ul> <p>The project site overlaps with predominantly Ecological Support Areas. Furthermore, perennial, and non-perennial ecosystem features traverse through the grid connection infrastructure corridor.</p>

### 3.6 Local Policy and Planning Context

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

**Table 3.4:** Relevant local legislation and policies for the Carolus EGI

Relevant policy	Relevance to the Carolus EGI
<p>Pixley Ka Seme District Municipality Integrated Development Plan (IDP) (2019-2020)</p>	<p>The vision for the PKSDM is “Developed and Sustainable District for Future Generations”.</p> <p>The mission statement that underpins the vision is:</p> <ul style="list-style-type: none"> <li>» Supporting our local municipalities to create a home for all in our towns, settlements, and rural areas to render dedicated services.</li> <li>» Providing political and administrative leadership and direction in the development planning process.</li> <li>» Promoting economic growth that is shared across and within communities.</li> <li>» Promoting and enhancing integrated development planning in the operations of our municipalities.</li> </ul>

Relevant policy	Relevance to the Carolus EGI
	<p>» Aligning development initiatives in the district to the National Development Plan.</p> <p>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.</p> <p>The IDP notes that the economy in the Pixley Ka Seme municipal area is characterised by:</p> <ul style="list-style-type: none"> <li>» High levels of poverty and low levels of education.</li> <li>» Low levels of development despite the strategic location in terms of the national transport corridors.</li> <li>» High rate of unemployment, poverty, and social grant dependence.</li> <li>» Prone to significant environmental changes owing to long-term structural changes (such as climate change, energy crises and other shifts).</li> </ul> <p>Of specific relevance, the IDP highlights the potential for renewable energy to help address some of these challenges.</p> <p>The development of the Carolus 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.</p>
<p>Pixley Ka Seme District Municipality Spatial Development Framework (SDF) (2017)</p>	<p>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:</p> <ul style="list-style-type: none"> <li>» Effective and efficient service delivery.</li> <li>» Optimal human and natural resource development.</li> <li>» Local economic growth and development, job creation and poverty alleviation.</li> <li>» A vibrant tourism industry.</li> <li>» To participate in the fight to reduce the infection rate and lessen the impact of HIV/AIDS and other communicable diseases.</li> <li>» A safe, secure and community friendly environment.</li> </ul> <p>The SDF identifies the opportunities and constraints associated with the district. An opportunity of relevance to the Carolus EGI (and the renewable energy facility it will cater for) is renewable energy and the development of a renewable energy hub in the region.</p>



## 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 Carolus EGI at the project site considered reasonable and feasible from a technical perspective by the project Applicant. Although the Carolus EGI is being assessed as part of a stand-alone BA process, the proposed infrastructure is directly linked to the Carolus Solar PV1 Facility proposed as part of the Pixley Park renewable energy cluster and is essential infrastructure for the operation of this facility to enable the electricity evacuation to the national grid. In the absence of the proposed Carolus EGI, the proposed Carolus Solar PV1 Facility will not be able to operate. Therefore, considering the dependency of the proposed Carolus Solar PV1 Facility on the Carolus EGI, the need and desirability of this grid connection infrastructure is directly linked to the need and desirability of the proposed Carolus Solar PV1 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 Carolus 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 Carolus EGI (which forms part of the Carolus Solar PV1 Facility), 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 Proportion of population with access to electricity. 7.1.2 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 Carolus EGI will facilitate the connection of the Carolus Solar PV1 Facility (which forms part of the Pixley Park Solar PV Cluster, with a combined capacity of 560MW), 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 and transmitting 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, and facilitating connection to the national electricity grid.

The Kyoto Protocol (1997) is also relevant to the need of the development of the Carolus EGI (which forms part of the Carolus Solar PV1 Facility) 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 Carolus 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%<sup>8</sup>. 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 Carolus EGI (which forms part of the Carolus Solar PV1 Facility) 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

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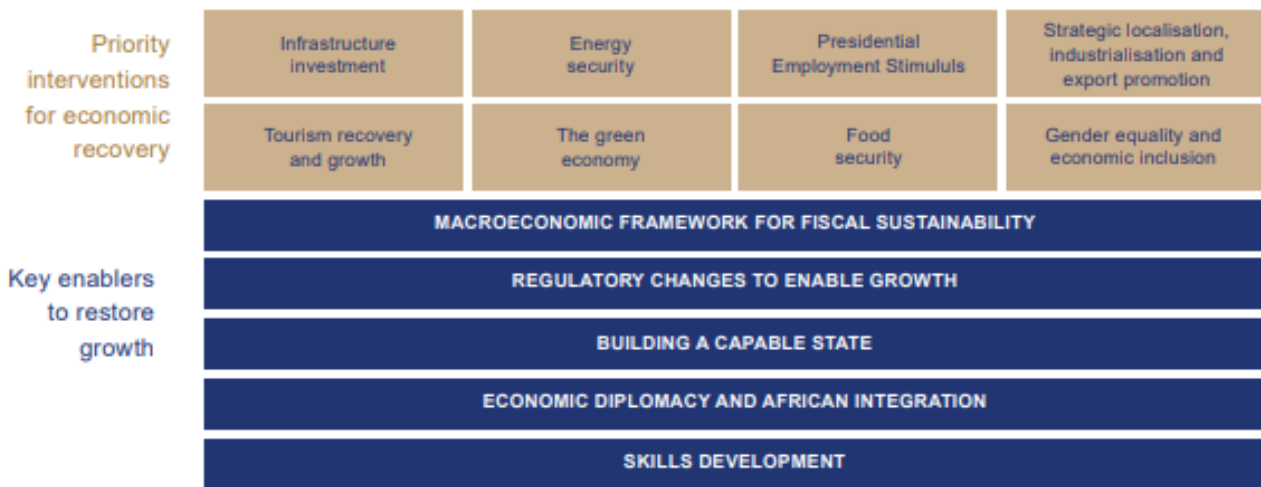
<sup>8</sup> <https://mg.co.za/business/2021-03-31-south-africa-tops-g20-coal-reliance-list-in-2020-report-finds/>

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 Carolus EGI, Northern Cape Province 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 Carolus EGI, Northern Cape Province,

evacuation of additional electricity from the Carolus Solar PV1 Facility (DFFE Ref.: 14/12/16/3/3/2/2154) will not be possible.

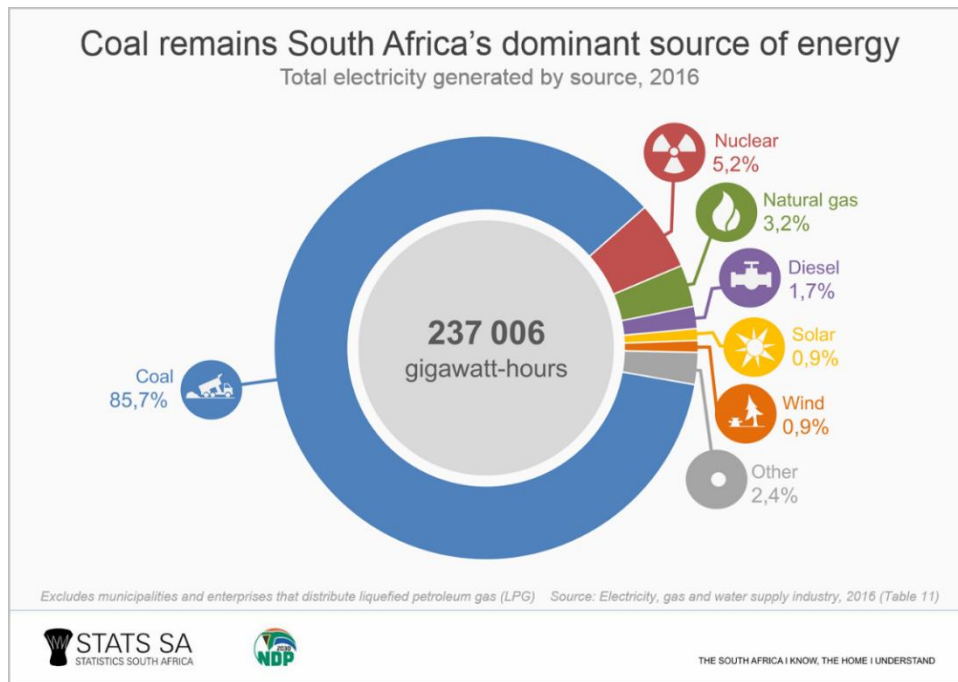
The Carolus EGI (which forms part of the Carolus Solar PV1 Facility) will ensure the provision of power from renewable resources, as well as play a significant role in the Just Energy Transition (“JET”) by supplying low-cost energy to the national grid. At the same time, it will contribute to a JET fund to assist in transitioning jobs from the fossil fuel sector to renewable energy.

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 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 Carolus EGI (which forms part of the Carolus Solar PV1 Facility) 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 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 Carolus EGI (which forms part of the Carolus Solar PV1 Facility) is therefore confirmed.

#### 4.5 Need from a District and Local Perspective

From a district level, the need for the development of the Carolus EGI (which forms part of the Carolus Solar PV1 Facility) is reflected within the Pixley Ka Seme District Municipality and the Emthanjeni 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 Emthanjeni Local Municipality IDP for 2019-2020 states that the municipality purchases its electricity from Eskom, through 3 intake points, which are De Aar, Britstown and Hanover. However, the municipality, like many municipalities in South Africa who are licensed suppliers of electricity, has a maintenance backlog, which emanates from possible lack of funds, equipment and technical expertise. The status quo is posing a serious threat with regard to continuous supply of electricity. An application for funding was handed to the Department and the municipality is currently drafting the Electricity Maintenance Plan.

Considering the requirements and need and desirability for the development of renewable energy facilities and the associated required infrastructure (i.e., the Carolus 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 Carolus EGI**

The feasibility of the project site and power line corridor for the development of the Carolus EGI also provides an indication of the desirability of the development within the site-specific location. As detailed in Chapter 2, Carolus Solar PV1 (Pty) Ltd, as the proponent for the Carolus EGI, identified one technically feasible location for the 132kV Eskom switching station, dependent on the layout of the Carolus Solar PV1 Facility, and one grid connection corridor for consideration in the BA process, dependent on the MTS connection point to the national grid. The grid connection corridor and footprint for the switching station are considered highly suitable from a technical perspective for development as they enable the connection of the renewable energy facility to the national grid. Through the assessment of a 300m wide grid connection corridor between 4.3km to 7.8km in extent for the placement of the power line, which is much larger than the area required for the servitude of up to 31m, an opportunity is created by the proponent for the avoidance of sensitive environmental features and areas, thereby ensuring that the Carolus 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 31m wide servitude for the Carolus EGI, consideration will also be given to landowner specific requirements as determined through the negotiation process. This approach will ensure that the final location of the EGI is desirable from an environmental and social perspective.

## 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 Carolus 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.

A comprehensive consultation process was designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which included I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders. This chapter serves to outline the process that was followed during the BA process.

### 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 Carolus EGI have been included in <b>section 5.2, Table 5.1</b> . The specific project activity relating to the relevant triggered listed activity has also been included in <b>Table 5.1</b> .
3(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The details of the public participation process undertaken have been included and described in <b>section 5.3.2</b> .
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 ( <b>Appendix C9</b> ). 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 ( <b>Appendix C9</b> ) to be submitted as part of the Final BA Report to the DFFE for decision-making.
3(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	The methodology used to assess the significance of the impacts of the Carolus EGI has been included in <b>section 5.5</b> .



Requirement	Relevant Section
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the BA process being undertaken for the Carolus EGI is included in <b>section 5.6</b> .

## 5.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to the Carolus 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 Carolus EGI is associated with the Carolus Solar PV1 Facility (which is planned as part of a larger cluster of proposed renewable energy 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 Carolus 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 Carolus 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 Carolus 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 33 but less than 275 kilovolts.  <b>The Carolus EGI will comprise the construction and operation of a 132kV switching station and 132kV double circuit overhead power line. The site is located outside of an urban area.</b>
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 © within 32 meters of a watercourse, measured from the edge of a watercourse.  <b>The development of the Carolus EGI will require the establishment of infrastructure with a physical footprint exceeding 100m<sup>2</sup> within a watercourse (access roads) and within 32m of a watercourse.</b>
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.  <b>The development of the Carolus 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 132kV switching station where such storage will occur inside containers</b>

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
<p>Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)</p>	<p>19</p>	<p><b>with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.</b></p> <p>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.</p> <p><b>Perennial and Non-Perennial Ecosystem features are present within the grid corridor footprint. During the construction phase, more than 10 cubic metres of rock will be removed from the water features for the development of the Carolus EGI access roads.</b></p>
<p>Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)</p>	<p>27</p>	<p>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation.</p> <p><b>The project will require the clearance of an area of more than 1ha of vegetation, but less than 20ha, to accommodate the grid connection infrastructure.</b></p>
<p>Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)</p>	<p>28(ii)</p>	<p>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.</p> <p><b>The Carolus EGI (considered to be an industrial development) will be constructed and operated on land currently zoned as agricultural. The total extent of the development area of the grid connection infrastructure will exceed 1ha</b></p>
<p>Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)</p>	<p>4(g)(ii)(ee)</p>	<p>The development of a road wider than 4 metres with a reserve less than 13.5 metres.</p>

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
		<p>g. Northern Cape</p> <p>ii. Outside urban areas:                      (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> <p><b><i>During construction, a permanent access road along the length of the power line corridor between 6 - 8m wide will be established to allow for movement of construction vehicles. This track will then be utilised for maintenance during operation. The Carolus EGI falls within the Northern Cape Province and outside an urban area. The grid corridor overlaps with an ESA.</i></b></p>
<p>Listing Notice 3                      (GNR 325)                      08 December 2014 (as amended on 07 April 2017)</p>	<p>10(g)(ii)(iii)(ee)</p>	<p>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</p> <p>g. Northern Cape</p> <p>ii. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.</p> <p>iii. Outside urban areas:                      (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> <p><b><i>The development of the Carolus 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 switching station, where such storage will be undertaken inside containers with a capacity not exceeding 80 cubic metres. A</i></b></p>

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
		<b>water course (i.e., Perennial and non-perennial rivers) infringes into the development footprint and grid corridor. The Carolus EGI falls within the Northern Cape Province and outside urban areas. The corridor overlaps with an ESA.</b>
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.  <b>The development of the Carolus EGI will require the clearance of an area of ~19.95ha of indigenous vegetation to accommodate the switching station, as well as vegetation associated with the power line servitude within an ESA in the Northern Cape Province.</b>
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.  <b>The development of the Carolus EGI will require the establishment of infrastructure with a physical footprint exceeding 10m<sup>2</sup> within a watercourse (access roads) and within 32m of a watercourse. The switching station will occupy a footprint of 19.95ha. A water course</b>

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
		<i>(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 Province and outside an urban area. The corridor overlaps with an ESA.</i>

### 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 5.2** 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 5.2:** List of Water Uses published under Section 21 of NWA, as amended.

Activity No.	Description of Water Use
Section 21 (c)	<p>Impeding or diverting the flow of water in a watercourse.</p> <p><i>The footprint considered for the establishment of the Grid Connection Infrastructure corridor and 132kV switching station are associated with the presence of watercourses, namely, perennial and non-perennial ecosystem features. Activities pertaining to the establishment of the infrastructure might encroach on the watercourses which may lead to an impediment and diversion of the flow of water in the watercourses.</i></p>
Section 21 (i)	<p>Altering the bed, banks, course or characteristics of a watercourse.</p> <p><i>The footprint considered for the establishment of the Grid Connection Infrastructure corridor and 132kV switching station are associated with the presence of watercourses, namely, perennial and non-perennial ecosystem features. Activities pertaining to the establishment of the infrastructure might alter the bed, banks, course or characteristics of the watercourses.</i></p>

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 000m<sup>2</sup> 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 Carolus 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 Carolus 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 Carolus EGI is required to evacuate power generated by the Carolus Solar PV1 Facility ([application for environmental authorisation in process, DFFE Ref.: 14/12/16/3/3/2/2154](#)) to the national grid. As the project is located within the Northern Cape Province, the Northern Cape DAEARD & LR 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 to the DFFE via email for approval on **20 September 2022**. Following the submission of the pre-application meeting request form, DFFE indicated that a meeting will not be required on **21 September 2022**, and that the applicant can proceed with submitting the application form and the Draft Basic Assessment Report.
- » Submission of the application form for Environmental Authorisation to the DFFE via the use of the DFFE Novell File 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 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.

**i. Stakeholder identification and Register of Interested and Affected Parties**

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

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater 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 Carolus EGI

<b>Organs of State</b>
<b>National Government Departments</b>
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)
<b>Government Bodies and State-Owned Companies</b>
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
<b>Provincial Government Departments</b>
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
<b>Local Government Departments</b>
Pixley Ka Seme District Municipality
Emthanjeni Local Municipality – including the Ward Councillor, ward committee members, community representative or local community forum members
<b>Commenting Stakeholders</b>
Agri SA and Agri Northern Cape
BirdLife South Africa
Endangered Wildlife Trust (EWT)
SENTECH
Wildlife and Environment Society of South Africa (WESSA)
<b>Landowners</b>
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<sup>9</sup> 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 –

<sup>9</sup> 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).

- (i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and
  - (ii) Any alternative site.
- 40.(2)(b) Giving written notice, in any of the manners provided for in section 47D of the Act, to –
- (i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
  - (ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
  - (iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;
  - (iv) The municipality which has jurisdiction in the area;
  - (v) Any organ of state having jurisdiction in respect of any aspect of the activity; and
  - (vi) Any other party as required by the competent authority.
- 40.(2)(c) Placing an advertisement in –
- (i) One local newspaper; or
  - (ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
- 40.(2)(d) Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and
- 40.(2)(e) Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to –
- (i) Illiteracy;
  - (ii) Disability; or
  - (iii) Any other disadvantage.

The BA process was announced with an invitation to the Organs of State, potentially affected and neighbouring landowners (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 Carolus EGI, and providing background information of the project and inviting I&APs to register on the project's database were distributed via email on **25 March 2022**. Evidence of distribution is contained in **Appendix C** of the Final BA Report. The BID was also available electronically on the Savannah Environmental website (<https://savannahsa.com/public-documents/grid-infrastructure/carolus-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 **3 March 2022**. Photographs of the site notices and the GPS coordinates of the locations where the site notices were placed are contained within **Appendix C3** of the Final BA Report.

- » Placement of an advertisement in the De Aar Echo Newspaper (in English) on **14 October 2022** 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.
  - \* Announced the availability of the BA report, the review period, and where it is accessible for review, and invited comment on the BA Report,

A copy of the newspaper advert as sent to the newspaper and the advert tear sheet are included in **Appendix C3** of the Final BA Report.
- » The BA Report was made available for review by I&APs for a 30-day review and comment period from **14 October 2022** to **14 November 2022**. The BA Report was made available on the Savannah Environmental website and all registered I&APs were notified of the availability on **14 October 2022** via email which included the link to access the report on the Savannah Environmental website (<https://savannahsa.com/public-documents/grid-infrastructure/carolus-grid-connection-infrastructure/>). The evidence of distribution of the BA Report has been included in the final BA Report, which will be submitted to the DFFE.

**iii. Public Involvement and Consultation**

In order to accommodate the varying needs of stakeholders and I&APs within the 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 Carolus EGI

Activity	Date
Announcement of the BA process in one local newspaper: » De Aar Echo Newspaper (English advertisement)	14 October 2022
Distribution of the BID, process notification letters and stakeholder reply form announcing the BA 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.	25 March 2022
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)	14 October 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.	14 October 2022
30-day review and comment period of the BA Report.	14 October 2022 – 14 November 2022
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group:	No additional meeting to those held for the PV facilities were requested.

Activity	Date
<ul style="list-style-type: none"> <li>» Landowners</li> <li>» Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations).</li> <li>» Where an I&amp;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 inclusion. The preferred language of the I&amp;AP has been considered when setting up these discussions.</li> <li>» Face-to-face meetings could be held where sanitary conditions can be assured.</li> </ul>	
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 has been made available in soft copies to I&APs. Hard copies could be made available on request. No such requests were received.

The BA Report was made available on the Savannah Environmental website (<https://savannahsa.com/public-documents/grid-infrastructure/carolus-grid-connection-infrastructure/>). The notification letter to all registered parties was distributed on **14 October 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 Final BA Report.

## v. Identification and Recording of Comments

Comments raised by I&APs to date have been collated into a Comments and Responses (C&R) Report which is included in **Appendix C9** of the final BA Report. The C&R Report includes detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised during the public participation process. The C&R Report were updated with all comments received during the 30-day review and comment period and are included as **Appendix C9** in this 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 are included in **Appendix C8**. Meeting notes of all virtual meetings and discussions undertaken during the 30-day review and comment period are included in **Appendix C8** of this final BA Report.

### 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 screening tool report is included in Appendix N of the BA Report. 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. A site sensitivity report which informed the specialist studies undertaken as part of this process is included in Appendix Q.

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

Specialist Assessment		Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural Assessment	Impact	Medium	The Soils and agriculture compliance statement is included in this BA Report as <b>Appendix G..</b>
Landscape/Visual Assessment	Impact	Very high	A Visual Impact study is included as <b>Appendix I</b> in this BA Report. The fact that some components of the proposed Carolus EGI may be visible does not necessarily imply a high visual impact. Sensitive visual receptors within (but not restricted to) a 3km buffer zone from the facility need to be identified and the severity of the visual impact needs to be assessed.
Archaeological and Cultural Heritage Assessment	Impact	Low	A Heritage Impact Assessment (which covers both archaeological and cultural aspects of the project site) is included in this BA Report as <b>Appendix H.</b>
Palaeontology Assessment	Impact	Very High	A Heritage Impact Assessment (which covers palaeontological aspects of the project site) is included in this BA Report as <b>Appendix H.</b>

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Terrestrial Biodiversity Impact Assessment	Very high	A Terrestrial Ecological Impact Assessment (including flora and fauna) has been undertaken for the Carolus EGI and is included as <b>Appendix D</b> of the BA Report.
Aquatic Biodiversity Impact Assessment	Very high	An Aquatic Impact Assessment has been undertaken for the project and is included as <b>Appendix E</b> of the BA Report.
Avian Assessment	Medium	An Avifauna Impact Assessment has been undertaken for the project and is included as <b>Appendix F</b> in this BA report.
Defence Assessment	Low	A defence of military base is not located within proximity to the development.
Plant Species Assessment	Low	A Terrestrial Ecological Impact Assessment (including flora and fauna) has been undertaken for the project and is included as <b>Appendix D</b> of the BA Report. Based on the outcomes of the desktop study and available data, it has been indicated that the development area falls within the areas identified as Low to Medium-Low Sensitivity.
Animal Species Assessment	Medium	
Social 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 <b>Appendix J</b> .

### 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. A Civil Aviation Compliance Statement has been prepared by the EAP and is included in **Appendix R**.

**Table 5.6:** Specialist consultants appointed to evaluate the potential impacts associated with the Carolus EGI

Specialist	Field of Study	Appendix
Andrew Husted of the Biodiversity Company	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 Carolus 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:

$$S = (E+D+M) P; \text{ where}$$

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 Final BA Report. 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**). 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 switching station (refer to **Appendix O**).

## 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 switching station identified by the developer represents a technically suitable site for the establishment of the Carolus 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 World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

**Table 5.7** provides an outline of the legislative permitting requirements applicable to the Carolus 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 Carolus EGI

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<b>National Legislation</b>			
Constitution of the Republic of South Africa (No. 108 of 1996)	<p>In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that:</p> <p><i>“Everyone has the right –</i></p> <ul style="list-style-type: none"> <li>» <i>To an environment that is not harmful to their health or well-being, and</i></li> <li>» <i>To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:</i> <ul style="list-style-type: none"> <li>* <i>Prevent pollution and ecological degradation,</i></li> <li>* <i>Promote conservation, and</i></li> <li>* <i>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</i></li> </ul> </li> </ul>	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)	<p>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).</p> <p>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.</p> <p>Considering the capacity of the Carolus EGI and the triggering of Activity 11 of Listing Notice 1 (GNR 327), a</p>	<p>DFFE – Competent Authority</p> <p>Northern Cape DAEARD&amp;LR – Commenting Authority</p>	The listed activities triggered by the proposed project have been identified and are being assessed as part of the BA process currently underway for the project. The BA process will culminate in the submission of a Final BA Report to the DFFE for decision-making

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>BA process is required in support of the Application for EA.</p>		
<p>National Environmental Management Act (No 107 of 1998) (NEMA)</p>	<p>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.</p> <p>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.</p>	<p>DFFE Northern Cape DAEARD&amp;LR</p>	<p>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.</p>
<p>Environment Conservation Act (No. 73 of 1989) (ECA)</p>	<p>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.</p> <p>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.</p> <p>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).</p>	<p>DFFE Northern Cape DAEARD&amp;LR</p>	<p>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 and distance from sensitive receptors.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Water Act (No. 36 of 1998) (NWA)</p>	<p>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.</p> <p>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.</p> <p>Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)).</p> <p>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)).</p>	<p>Regional Department of Water and Sanitation</p>	<p>Perennial and Non-Perennial Ecosystems are present within the grid corridor as identified in the Aquatics Statement (<b>Appendix E</b>). 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.</p>
<p>Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)</p>	<p>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.</p> <p>Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which</p>	<p>Department of Mineral Resources and Energy (DMRE)</p>	<p>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.</p> <p>In terms of Section 53 of the MPRDA, approval is required from the Minister of</p>

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)	<p>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.</p> <p>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.</p> <p>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.</p>	Northern Cape DAEARD&LR / Pixley ka Seme Municipality	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)	<p>Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance.</p> <p>Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites.</p> <p>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.</p>	<p>South African Heritage Resources Agency (SAHRA)</p> <p>Ngwao Boswa Kapa Bokone (NBKB) – provincial heritage authority</p>	<p>A Heritage Impact Assessment (HIA) (with field work) has been undertaken as part of the BA process (refer to <b>Appendix H</b> of this BA Report).</p> <p>Should a heritage resource be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone in accordance with Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>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.</p> <p>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.</p>		
<p>National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)</p>	<p>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.</p> <p>Three government notices have been published in terms of Section 56(1) of NEM:BA as follows:</p> <ul style="list-style-type: none"> <li>» Commencement of TOPS Regulations, 2007 (GNR 150).</li> <li>» Lists of critically endangered, vulnerable and protected species (GNR 151).</li> <li>» TOPS Regulations (GNR 152).</li> </ul> <p>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:</p>	<p>DFFE</p> <p>Northern Cape DAEARD&amp;LR</p>	<p>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.</p> <p>An Ecology Impact Assessment has been undertaken for the Carolus EGI (<b>Appendix D</b>). No plant species protected under the National Environmental Management: Biodiversity Act (No. 10 of 2004) were identified on site.</p>



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)	<p>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.</p> <p>Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).</p>	DFFE  Northern Cape DAEAR&LR	An Ecology Impact Assessment ( <b>Appendix D</b> ) 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 switching station site or grid connection corridor.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	<p>Section 05 of CARA provides for the prohibition of the spreading of weeds.</p> <p>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.</p> <p>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.</p>	Department of Agriculture, Land Reform and Rural Development (DALRD)	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>» Uprooting, felling, cutting or burning.</li> <li>» 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.</li> </ul>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<ul style="list-style-type: none"> <li>» 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.</li> <li>» 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.</li> <li>» 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.</li> </ul>
<p>National Forests Act (No. 84 of 1998) (NFA)</p>	<p>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.</p> <p>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".</p>	<p>Department of Agriculture, Land Reform and Rural Development (DALRD)</p>	<p>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.</p> <p>An Ecology Impact Assessment undertaken as part of the BA 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 <b>Appendix D</b> of this BA Report).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<p>No tree species protected under the National Forests Act (No. 84 of 1998) were identified within the grid connection corridor.</p>
<p>National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)</p>	<p>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.</p> <p>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.</p>	<p>DFFE</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the Carolus EGI in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.</p>
<p>Hazardous Substances Act (No. 15 of 1973) (HAS)</p>	<p>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</p>	<p>Department of Health (DoH)</p>	<p>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.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>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.</p> <ul style="list-style-type: none"> <li>» 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</li> <li>» Group IV: any electronic product, and</li> <li>» Group V: any radioactive material.</li> </ul> <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>		<p>If applicable, a license would be required to be obtained from the DoH.</p>
<p>National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)</p>	<p>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.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> <li>» Adding other waste management activities to the list.</li> <li>» Removing waste management activities from the list.</li> <li>» Making other changes to the particulars on the list.</li> </ul> <p>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.</p>	<p>DFFE – Hazardous Waste</p> <p>Northern Cape DAEARD&amp;LR – General Waste</p>	<p>No waste listed activities are triggered by the Carolus 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.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> <li>» The containers in which any waste is stored, are intact and not corroded or in</li> <li>» Any other way rendered unfit for the safe storage of waste.</li> <li>» Adequate measures are taken to prevent accidental spillage or leaking.</li> <li>» The waste cannot be blown away.</li> <li>» Nuisances such as odour, visual impacts and breeding of vectors do not arise, and</li> <li>» Pollution of the environment and harm to health are prevented.</li> </ul>		
<p>National Road Traffic Act (No. 93 of 1996) (NRTA)</p>	<p>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.</p> <p>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.</p> <p>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</p>	<p>South African National Roads Agency (SANRAL) – national roads</p> <p>Northern Cape Department of Transport, Safety and Liaison</p>	<p>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 switching station components may not meet specified dimensional limitations (height and width) which will require a permit.</p>

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.		
<b>Provincial Policies / Legislation</b>			
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	<p>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:</p> <ul style="list-style-type: none"> <li>» Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property;</li> <li>» Aquatic habitats may not be destroyed or damaged;</li> <li>» 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;</li> </ul> <p>The Act provides lists of protected species for the Province.</p>	Northern Cape DAEARD&LR	<p>A collection/destruction permit must be obtained from Northern Cape DAEARD&amp;LR for the removal of any protected plant or animal species found on site.</p> <p>Should these species be confirmed within the development footprint during any phase of the project, permits will be required.</p> <p>An Ecology Impact Assessment has been undertaken as part of the BA process (refer to <b>Appendix D</b>). 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.</p>

### **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 Carolus 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 Carolus 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(1)(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	<p>The environmental attributes associated with the development of Carolus EGI project site as well as the broader environment, are described and considered within this chapter and include the following:</p> <p>The regional setting within which the project site is located is described in <b>section 6.2</b>.</p> <p>The climatic conditions of the De Aar area within which the project site is located is discussed in <b>section 6.3</b>.</p> <p>The biophysical characteristics of the project site and the surrounding areas are described in <b>section 6.4</b>. These include topography and terrain, geology, soils, and agricultural potential the ecological profile which includes the vegetation patterns, listed plant species, critical biodiversity areas and broad-scale processes, freshwater resources, terrestrial fauna and avifauna.</p> <p>The heritage and cultural aspects of the project site and the surrounding areas (including the archaeology, palaeontology, and cultural landscape) is discussed in <b>section 6.5</b>.</p> <p>The visual quality, land use and settlement patterns of the affected area surrounding the project site is described in <b>section 6.6</b>.</p> <p>The social conditions within which the project site is located is described in <b>section 6.7</b>.</p>

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



## 6.2 Regional Setting: Description of the Broader EGI Study Area

The Carolus EGI is proposed to be located approximately 10km east of De Aar, within the Emthanjeni Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province, on the following farm properties:

- » Portion 1 of the Farm Riet Fountain 6
- » Portion 0 of the Farm Wag ten Bittje 5
- » Portion 3 of the Farm Carolus Poort 3
- » Portion 0 of the Farm Wag ń Bietjie Annex C 137

### **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 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 411km<sup>2</sup>, 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)

The broader project site for the establishment of the Carolus EGI and associated infrastructure is located within the Emthanjeni Local Municipality. The Emthanjeni Local Municipality is a Category B municipality within the Pixley Ka Seme District in the Northern Cape Province. It is bordered by all the other local municipalities as it is central within the district, the Western Cape Provinces in the south, the Eastern Cape in the east. Its location is approximately 300 km south-west of Kimberley, 440 km south-east of Upington, 300 km north-east of Beaufort-West and 300 km south-west of Bloemfontein. The land area comprises 11% of the district land area and 3% of the province. It represents approximately 23% of the district population.

The Emthanjeni Local Municipality, one of the district's eight local municipalities, covers an area of ~ 13 486km. Cities and/or towns within the municipality include De Aar, Hanover, and Britstown. The agricultural sector is the main economic sector in the Local Municipality. According to census 2011, the population grew from 42 356 in 2011 to 44 100 in 2016, indicating an annual population growth rate of 1.6%.

**Project Site**

Areas surrounding the project site are generally sparsely populated, with the highest concentration of people living in the town of De Aar. 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 project site is situated directly adjacent to the N10 national road. The R389 are located directly through the proposed development area, providing direct access to the project site. The gravel main access road

(R389) provides direct access to the project site and the development area and will be used to access the project site and development area during the project lifecycle.

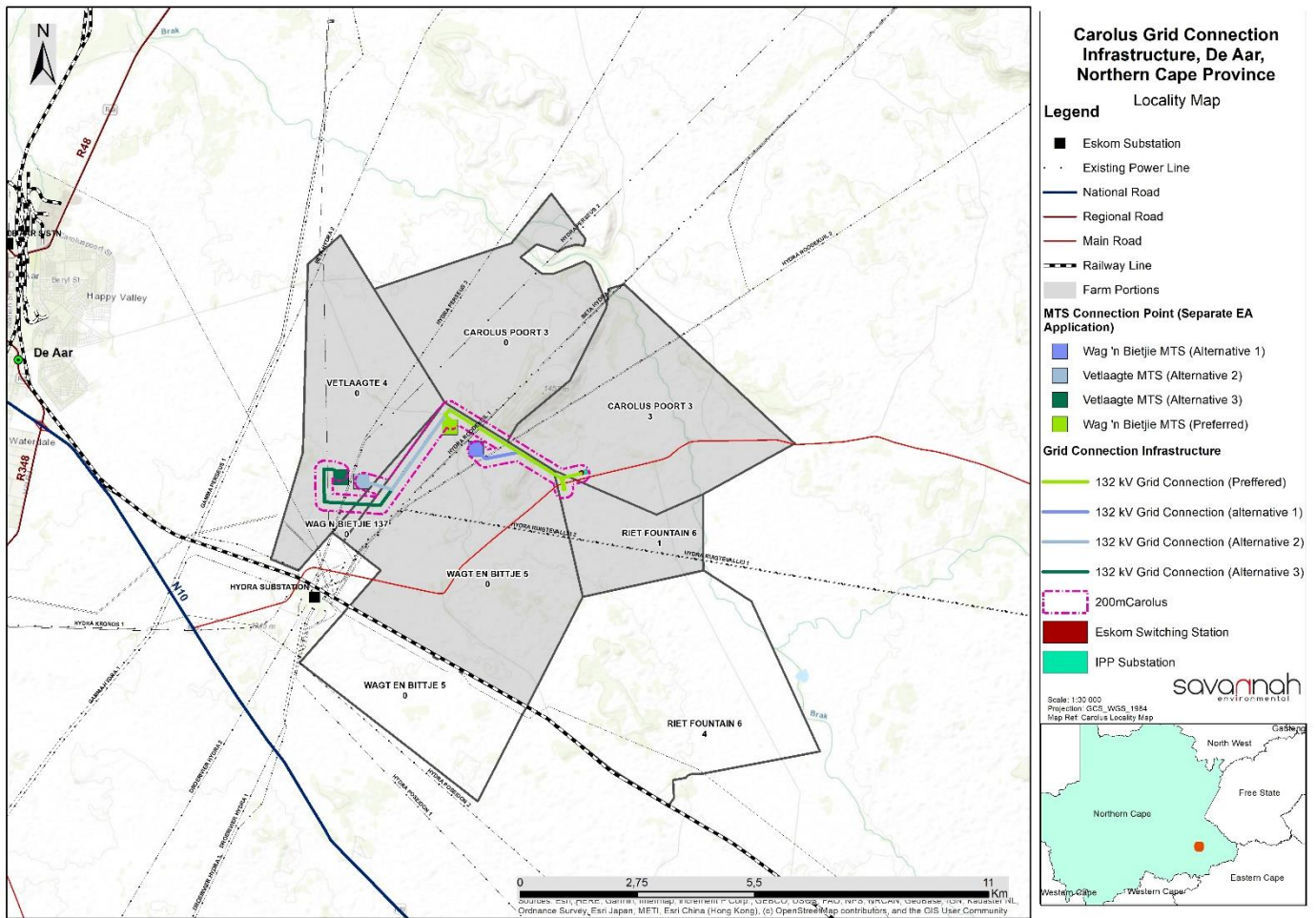
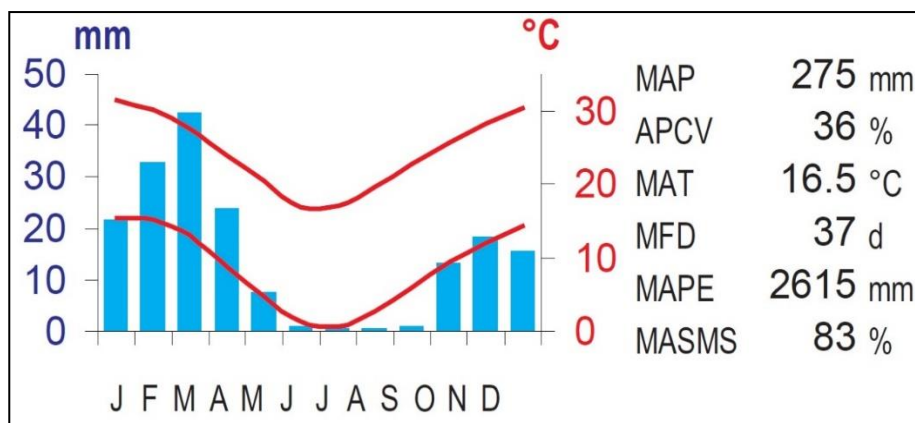


Figure 6.3: Location of the Carolus EGI

### 6.3 Climatic Conditions

The project area is considered to have a semi-arid (local steppe) climate that receives limited rainfall. This region's rainfall peaks during autumn months, especially March. The Mean Annual Precipitation (MAP) ranges from 190 to 400 mm with the mean minimum and maximum monthly temperatures for Britstown being -3.6 °C and 37.9 °C for July and January respectively. These arid climate systems receive majority of their rainfall during short rainfall events and likely present surface flow for limited time periods while some rainfall events can be considered as immense with resultant flooding (also see Figure 6.4 for more information).



**Figure 6.4:** Climatic graph for De Aar area, Northern Cape within which the proposed project site is located.

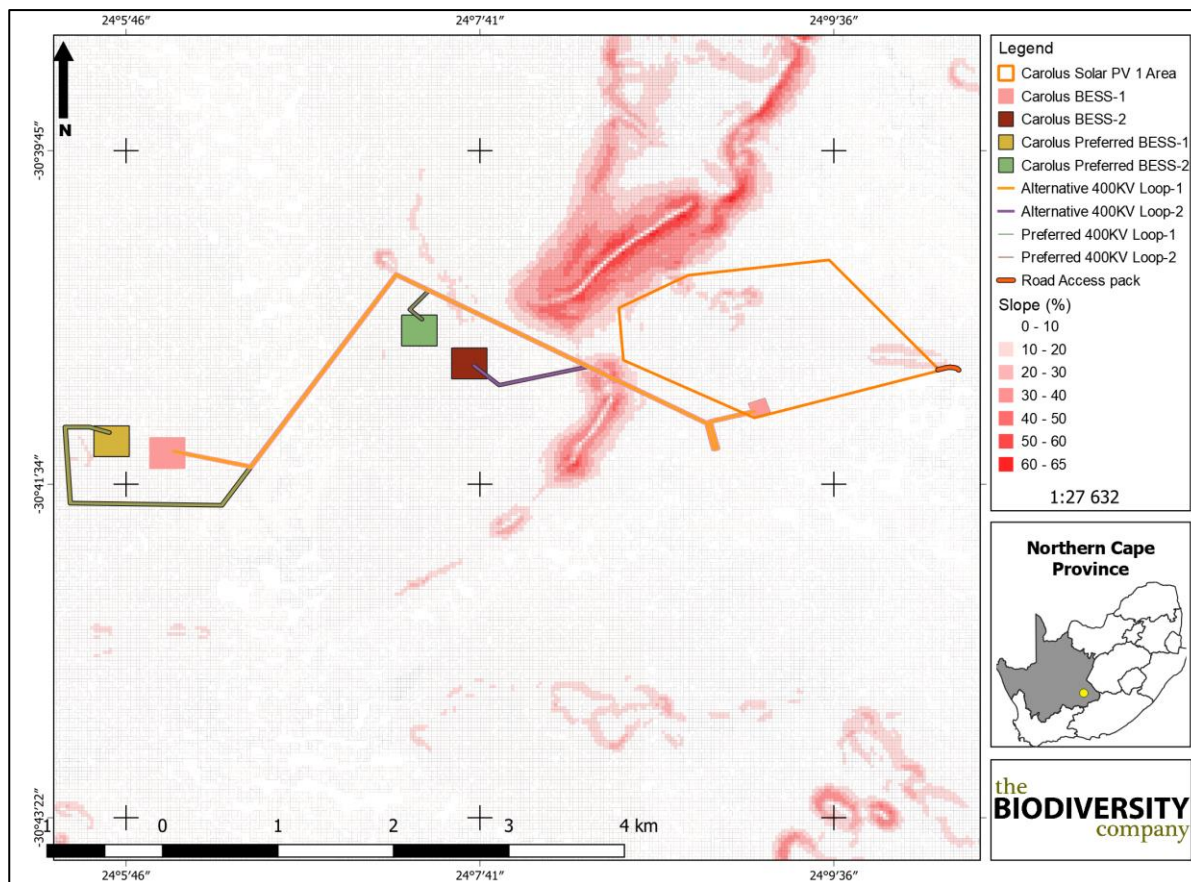
#### 6.4 Biophysical Characteristics of the Study Area

The following section provides an overview and description of the biophysical characteristics of the study area and has been informed by specialist studies (**Appendix D-L**) undertaken for this BA.

##### 6.4.1 Topographical Profile

The slope percentage of the project area has been calculated and is illustrated below (**Figure 6.5**). Most of the project area is characterised by a slope percentage between 0 and 10%, with some smaller patches within the project area characterised by a slope percentage ranging from 10 to 65%. This illustration indicates a non-uniform topography in scattered areas most of the area being characterised by a gentle slope. The DEM of the project area indicates an elevation between 1 238 to 1 462 Metres Above Sea Level (MASL).

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees

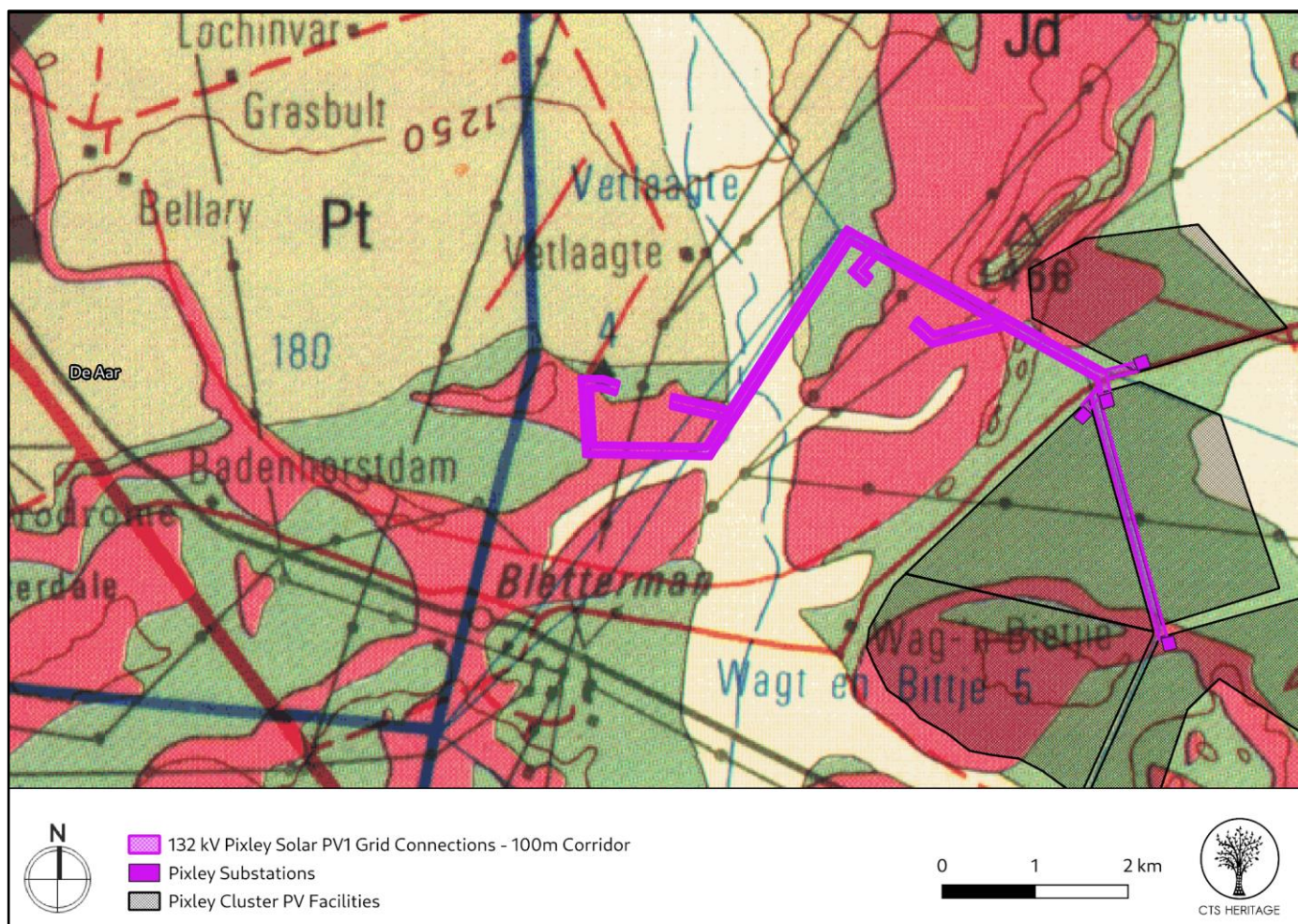


**Figure 6.5:** The slope percentage calculated for the project area within which the Carolus EGI is proposed

#### 6.4.2 Geology, Land Type and Soils

##### Geological Setting

The geology of this area is characterised by the Volksrust Formation shales as well as the Prince Albert Formation and the Dwyka Group diamictites (Mucina and Rutherford, 2006). The Jurassic Karoo Dolerite sills and sheets support the vegetation in this area soils varying from shallow to deep. Red and yellow-brown apedal soils are common in this region with the Ae, Fc and Ag land types prominently featuring.



**Figure 6.6:** Extracted from the Council for GeoSciences Map 3024 for Colesburg indicating that the development area is underlain by Jd: Jurassic Dolerite, Pt (lighter green): Tierberg Formation of the Ecca Group and Pa (darker green): Adelaide Subgroup of the Beaufort Group

**Land Types and Soil Forms of the project site**

Existing soil information was obtained from the Land Type database (Land Type Survey Staff, 1972 – 2006). A land type is an area with similar climate, topography and soil distribution patterns which can be demarcated on a scale of 1:250 000.

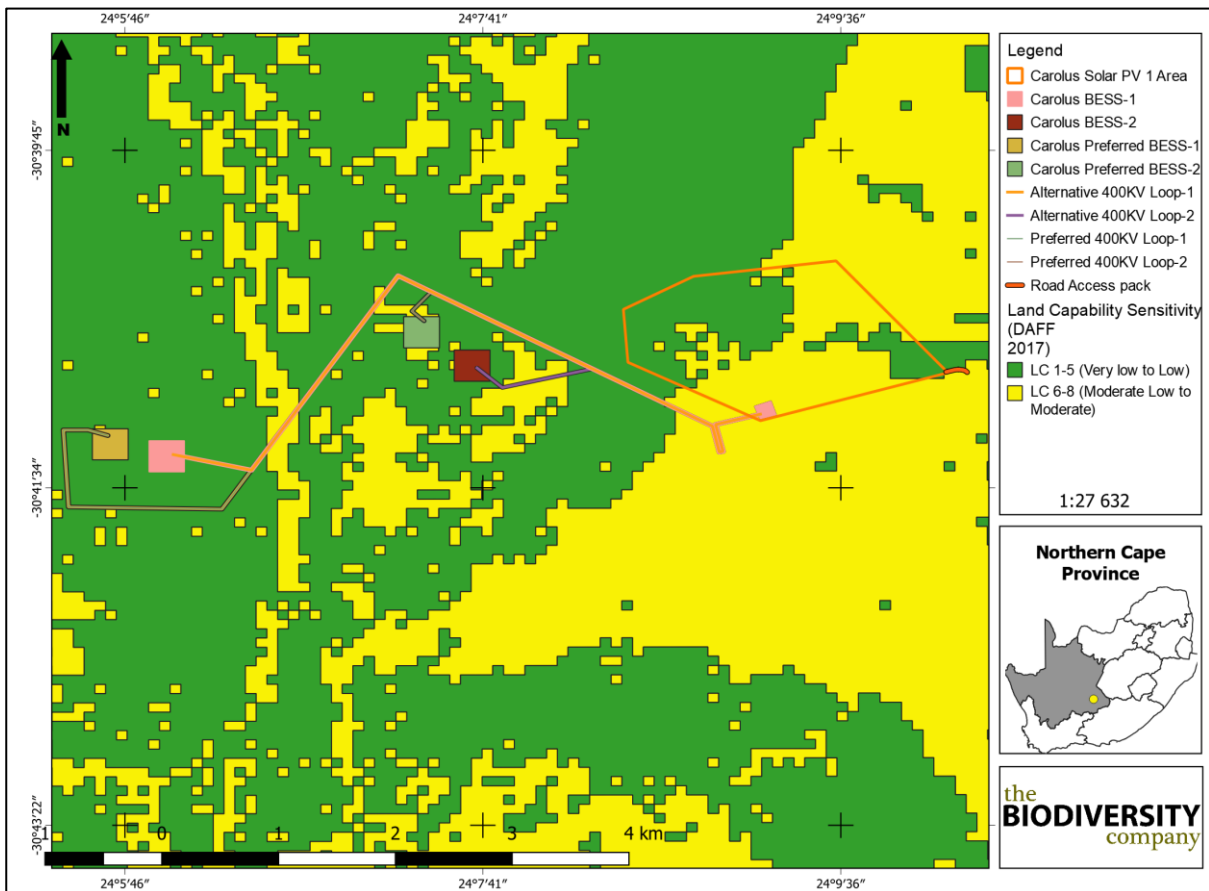
According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ae 137, 138, 139 and 140 as well as the Ib 47 and Fb 72 land types. The Ae land types are characterized with Hutton, Oakleaf and Mispah soil forms according to the Soil Classification Working Group, (1991) with the possibility of other soils and bare rocky areas. The Ae land type consists of red to yellow apedal soils which are freely drained. The soils tend to have a high base status and are deeper than 300 mm. 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

Considering the occurrence of various soil forms that are commonly associated with high land capabilities, it is likely that areas with high land capability sensitivity do occur within the project area. However, due to the poor climatic capability, the ultimate land potential is more likely to be low.

**Land Capability and agricultural potential of the project site**

The landscape associated with the site is a typical Karoo landscape consisting of dolerite koppies and ridges separated by valley bottoms. The land uses surrounding the project area predominantly includes farming (grazing) activities between natural (open – predominantly mountainous areas) land situated between the aforementioned watercourses. Land use within a catchment influences the ecological integrity of the associated watercourses. Due to the limited land and water use modification within the project related catchment areas, the SQRs were considered largely natural to moderately modified at a desktop level (DWS, 2014). Ephemeral watercourses of the arid regions such as the Karoo are typically dependent on groundwater discharge and are particularly vulnerable to changes in hydrology and are known to be slow to recover from any impacts.

The two major aspects determining the status of the SQRs are water quality and habitat conditions. The physico-chemical (water quality) modifications within the two SQRs have been rated as small with low volumes of return water (effluent) input expected from the agricultural and urban activities (altered land use) present in the catchment areas. Modifications to instream/riparian/wetland habitat continuity, and flow modification were rated to range from small to large within the two SQRs. Additionally, the habitat diversity classes of the SQRs were rated as very low with a low diversity of fish (*Enteromius anoplus* - Chubbyhead Barb and *Labeo umbratus* – Moggel) and macroinvertebrate species expected within these systems. Despite this these taxa maintain a moderate sensitivity to altered flows and water quality, highlighting the need for the project to limit impacts to these aspects.



**Figure 6.7:** Land capability sensitivity present within the project area



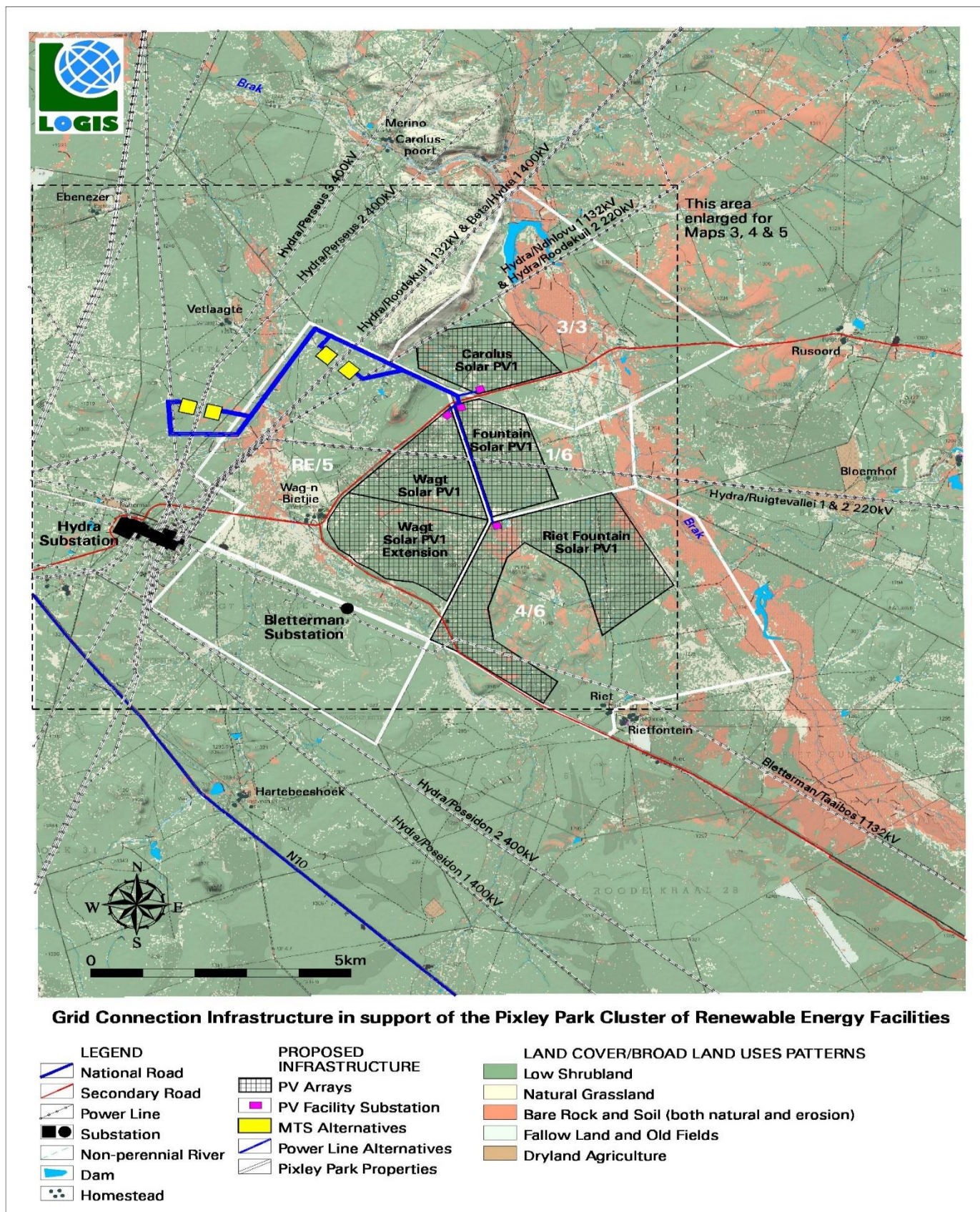


Figure 6.8: Land cover and broad land use patterns.

### 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 2 (this land potential level is characterised by high potential: Very infrequent and/or minor limitations due to soil, slope, temperatures, or rainfall. Appropriate contour protection must be implemented and inspected).

#### **6.4.4 Land Use**

The proposed Carolus EGI development is located approximately 12 km east of De Aar within the Emthanjeni Local Municipality in the Northern Cape Province. The area is immediately north-east of the hydra substation and approximately 8 km north of the N10 Highway. The surrounding land use includes nature or game reserves, wool production, mountainous areas, agricultural activities predominantly livestock farming and watercourses.

The land uses surrounding the project area predominantly includes farming (grazing) activities between natural (open – predominantly mountainous areas) land situated between watercourses. Land use within a catchment influences the ecological integrity of the associated watercourses. Due to the limited land and water use modification within the project related catchment areas, the SQRs were considered largely natural to moderately modified at a desktop level (DWS, 2014). Ephemeral watercourses of the arid regions such as the Karoo are typically dependent on groundwater discharge and are particularly vulnerable to changes in hydrology and are known to be slow to recover from any impacts.

The N10 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 Northern Cape Province and freight carriers transporting goods in between these two destinations. Other arterial or main roads within the study area include the N1 and the R388.

There are no designated protected areas within the region and no major tourist attractions, or destinations were identified within the study area.

#### **6.4.5 Ecological Profile of the Broader EGI 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 6.9**. The proposed Carolus EGI is situated within two biomes, the Grassland and Nama Karoo biomes. The Nama Karoo Biome, which is a large, landlocked region on the central plateau of the western half of South Africa and extends into south-eastern Namibia. This is an arid biome with majority of the river systems being non-perennial. Apart from the Orange River and the few permanent streams in the southwest that originate in higher-rainfall neighbouring areas, the limited number of perennial streams that originate in the Nama-Karoo are restricted to the more mesic east. The low precipitation is unreliable (coefficient of variation of annual rainfall up to 40%) and droughts are unpredictable and prolonged. The unpredictable rainfall impedes the dominance of leaf succulents and is too dry in summer for dominance by perennial grasses alone, and the soils are generally too shallow, and the rainfall is too low for trees. Unlike other biomes of southern Africa, local endemism is very low and consequently, the Nama-Karoo Biome does not contain any centre of endemism. Despite relatively low floristic diversity, the Nama-Karoo vegetation has a high diversity of plant life forms. These include co-occurring ephemerals, annuals, geophytes, C3 and C4 grasses, succulents, deciduous and

evergreen chamaephytes and trees. This is probably a consequence of an ecotonal and climatically unstable nature of the region.

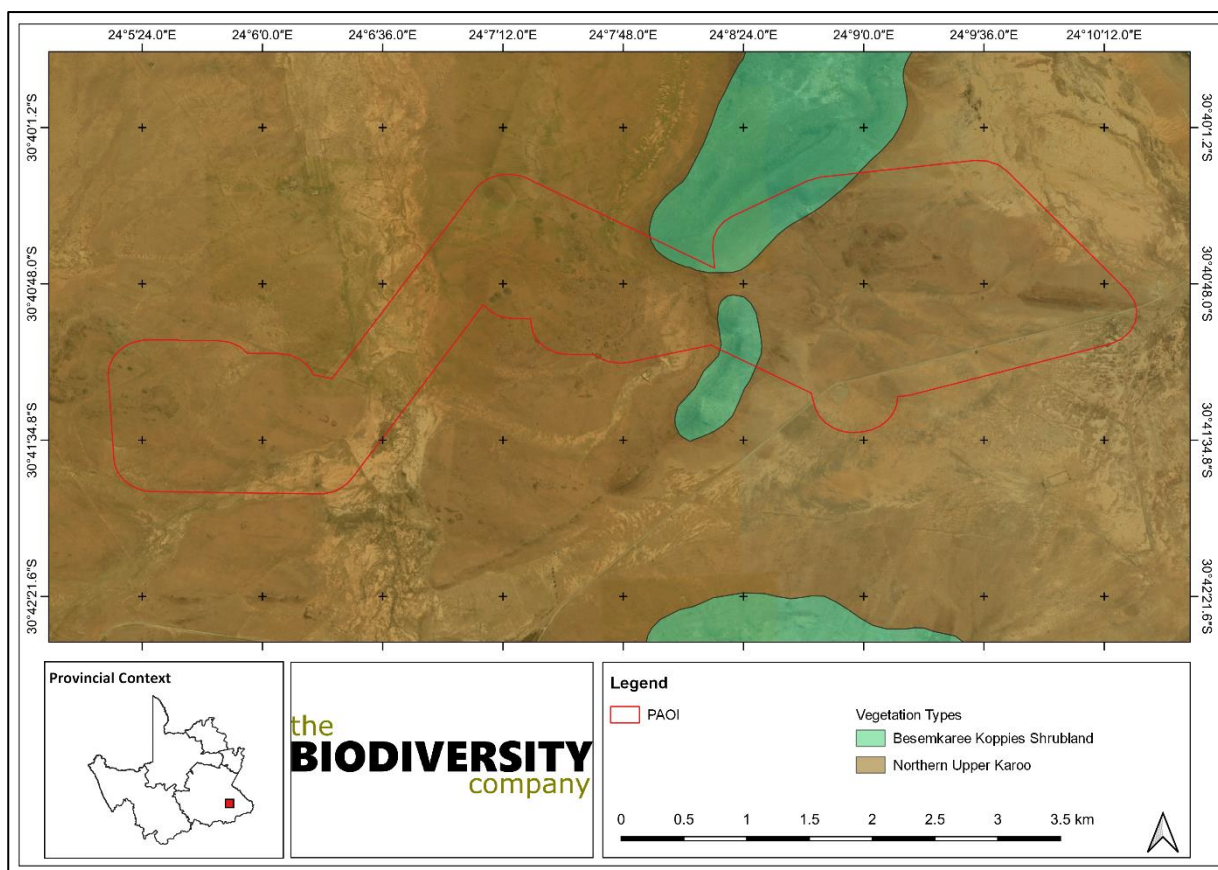
Scattered rocky hills, mesas and inselbergs are distinctive features of an otherwise relatively homogeneous landscape. These features are either capped by or wholly comprised of dolerite, which is a fine- to medium-grained dark, intrusive igneous rock. The surrounding plains and lowland habitats are dominated by shale and sandstone, which is a fine- to medium-grained sedimentary rock. Due to their structure, these features provide greater heterogeneity in habitat and microclimate than the surrounding plains and therefore, support higher species richness and diversity (Petersen *et al*, 2020). Species richness and relative cover of the varying plant growth forms are driven by gradients of a combination soil, environmental and climatic parameters. Unlike other biomes of southern Africa, local endemism is very low and consequently, the Nama-Karoo Biome does not contain any centre of endemism.

The Grassland biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- » Seasonal precipitation; and
- » The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees. On a fine-scale vegetation type, the project area overlaps with Besemkaree Koppies Shrubland and Northern Upper Karoo.



**Figure 6.9:** Map illustrating the vegetation types associated with the Carolus EGI

**Northern Upper Karoo**

Distribution:

Nama Karoo Biome, which is a large, landlocked region on the central plateau of the western half of South Africa and extends into south-eastern Namibia. This is an arid biome with majority of the river systems being non-perennial. Apart from the Orange River and the few permanent streams in the southwest that originate in higher-rainfall neighbouring areas, the limited number of perennial streams that originate in the Nama-Karoo are restricted to the more mesic east. The low precipitation is unreliable (coefficient of variation of annual rainfall up to 40%) and droughts are unpredictable and prolonged. The unpredictable rainfall impedes the dominance of leaf succulents and is too dry in summer for dominance by perennial grasses alone, and the soils are generally too shallow, and the rainfall is too low for trees. Unlike other biomes of southern Africa, local endemism is very low and consequently, the Nama-Karoo Biome does not contain any centre of endemism.

Vegetation and Landscape Features:

Flat to gently sloping dominated by dwarf shrubs and grasses. Comprising of Shales of the Volksrust Formation and to a lesser extent the Prince Albert Formation (both Ecca Group) as well as Dwyka Group diamictites form the underlying geology. Jurassic Karoo Dolerite sills and sheets support this vegetation complex in places. Wide stretches of land are covered by superficial deposits including calcretes of the Kalahari Group. Soils are variable from shallow to deep, red, yellow, apedal, freely drained soils to very shallow Glenrosa and Mispah forms.

### Important Taxa:

- » **Small Trees:** *Senegalia mellifera* subsp. *detinens*, *Boscia albitrunca*.
- » **Tall Shrubs:** *Lycium cinereum*, *L. horridum*, *L. oxycarpum*, *L. schizocalyx*, *Rhigozum trichotomum*.
- » **Low Shrubs:** *Chrysocoma ciliata*, *Gnidia polycephala*, *Pentzia calcarea*, *P. globosa*, *P. incana*, *P. spinescens*, *Rosenia humilis*, *Amphiglossa triflora*, *Aptosimum marlothii*, *A. spinescens*, *Asparagus glaucus*, *Barleria rigida*, *Berkheya annectens*, *Eriocephalus ericoides* subsp. *ericoides*, *E. glandulosus*, *E. spinescens*, *Euryops asparagoides*, *Felicia muricata*, *Helichrysum lucilioides*, *Hermannia spinosa*, *Leucas capensis*, *Limeum aethiopicum*, *Melolobium candicans*, *Microloma armatum*, *Osteospermum leptolobum*, *O. spinescens*, *Pegolettia retrofracta*, *Pentzia lanata*, *Phyllanthus maderaspatensis*, *Plinthus karooicus*, *Pteronia glauca*, *P. sordida*, *Selago geniculata*, *S. saxatilis*, *Tetragonia arbuscula*, *Zygophyllum lichtensteinianum*.
- » **Succulent Shrubs:** *Hertia pallens*, *Salsola calluna*, *S. glabrescens*, *S. rabieana*, *S. tuberculata*, *Zygophyllum flexuosum*.
- » **Semiparasitic Shrub:** *Thesium hystrix*.
- » **Herbs:** *Chamaesyce inaequilatera*, *Convolvulus sagittatus*, *Dicoma capensis*, *Gazania krebsiana*, *Hermannia comosa*, *Indigofera alternans*, *Lessertia pauciflora*, *Radyera urens*, *Sesamum capense*, *Sutera pinnatifida*, *Tribulus terrestris*, *Vahlia capensis*.
- » **Succulent Herb:** *Psilocaulon coriarium*.
- » **Geophytic Herb:** *Moraea pallida*.
- » **Graminoids:** *Aristida adscensionis*, *A. congesta*, *A. diffusa*, *Enneapogon desvauxii*, *Eragrostis lehmanniana*, *E. obtusa*, *E. truncata*, *Sporobolus fimbriatus*, *Stipagrostis obtusa*, *Eragrostis bicolor*, *E. porosa*, *Fingerhuthia africana*, *Heteropogon contortus*, *Stipagrostis ciliata*, *Themeda triandra*, *Tragus berteronianus*, *T. koelerioides*, *T. racemosus*.

### Biogeographically Important Taxa

- » **Herb:** *Convolvulus boedeckerianus*.
- » **Tall Shrub:** *Gymnosporia szyszlowiczii* subsp. *namibiensis*.

### Endemic Taxa

- » **Succulent Shrubs:** *Lithops hookeri*, *Stomatium pluridens*.
- » **Low Shrubs:** *Atriplex spongiosa*, *Galenia exigua*.
- » **Herb:** *Manulea deserticola*.

### Conservation

No portion is conserved in statutory conservation areas. About 4% has been cleared for cultivation (the highest proportion of any type in the Nama-Karoo) or irreversibly transformed by building of dams. Areas of human settlements are increasing in the north-eastern part of this vegetation type. *Prosopis glandulosa*, regarded as one of the most important invasive alien plants in South Africa, is widely distributed in this vegetation type.

This vegetating type dominates the low-lying areas of the project site. As this vegetation type is widespread throughout the region and largely untransformed the floral species found on the site are not at significant risk of negative impact from the development.

## **Besemkaree Koppies Shrubland**

### Distribution:

Northern Cape, Free State and Eastern Cape Provinces: On plains of Eastern Upper Karoo (between Richmond and Middelburg in the south and the Orange River) and within dry grasslands of the southern and central Free State. Extensive dolerite-dominated landscapes along the upper Orange River belong to this unit as well. Extends northwards to around Fauresmith in the northwest and to the Wepener District in the northeast. Altitude 1120– 1680 m.

### Vegetation and Landscape Features:

Slopes of koppies, butts and tafelbergs covered by two-layered karroid shrubland. The lower (closed-canopy) layer is dominated by dwarf small-leaved shrubs and, especially in high precipitation years, also by abundant grasses, while the upper (loose canopy) layer is dominated by tall shrubs. Dolerite koppies and sills embedded within Karoo Supergroup sediments. The dolerite dykes and sills are igneous intrusions that are the result of extensive volcanic activity, which accompanied the break-up of Gondwana in the Jurassic. In places the slopes of mesas and butts carrying this vegetation type have a mixed geology where dolerites occur together with sandstones and mudstones of the Ecca and Beaufort Groups.

### Important Taxa:

- » **Small Trees:** *Cussonia paniculata*, *Ziziphus mucronata*.
- » **Tall Shrubs:** *Diospyros austro-africana*, *Euclea crispa* subsp. *ovata*, *Olea europaea* subsp. *africana*, *Rhus burchellii*, *R. ciliata*, *R. erosa*, *Buddleja saligna*, *Diospyros lycioides* subsp. *lycioides*, *Ehretia rigida*, *Grewia occidentalis*, *Gymnosporia polyacantha*, *Tarchonanthus minor*.
- » **Low Shrubs:** *Asparagus suaveolens*, *Chrysocoma ciliata*, *Amphiglossa triflora*, *Aptosimum elongatum*, *Asparagus striatus*, *Diospyros pallens*, *Eriocephalus ericoides*, *E. spinescens*, *Euryops empetrifolius*, *Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Helichrysum dregeanum*, *H. lucilioides*, *Hermannia multiflora*, *H. vestita*, *Lantana rugosa*, *Limeum aethiopicum*, *Lycium cinereum*, *Melolobium candicans*, *M. microphyllum*, *Nenax microphylla*, *Pegolettia retrofracta*, *Pentzia globosa*, *Rhigozum obovatum*, *Selago saxatilis*, *Stachys linearis*, *S. rugosa*, *Sutera halimifolia*, *Wahlenbergia albens*.
- » **Succulent Shrubs:** *Aloe broomii*, *Chasmatophyllum musculinum*, *C. verdoorniae*, *Cotyledon orbiculata* var. *dactylopsis*, *Pachypodium succulentum*.
- » **Graminoids:** *Aristida adscensionis*, *A. congesta*, *A. diffusa*, *Cenchrus ciliaris*, *Cymbopogon caesius*, *Cynodon incompletus*, *Digitaria eriantha*, *Eragrostis curvula*, *E. lehmanniana*, *Heteropogon contortus*, *Setaria lindenbergiana*, *Themeda triandra*, *Tragus koelerioides*, *Cymbopogon pospischilii*, *Enneapogon scoparius*, *Eragrostis chloromelas*, *E. obtusa*, *Eustachys paspaloides*, *Fingerhuthia africana*, *Hyparrhenia hirta*, *Sporobolus fimbriatus*.
- » **Herbs:** *Convolvulus sagittatus*, *Dianthus caespitosus* subsp. *caespitosus*, *Gazania krebsiana* subsp. *krebsiana*, *Hibiscus pusillus*, *Indigofera alternans*, *I. rhytidocarpa*, *Lepidium africanum* subsp. *africanum*, *Pollichia campestris*.
- » **Herbaceous Climber:** *Argyrolobium lanceolatum*.
- » **Geophytic Herbs:** *Albuca setosa*, *Asplenium cordatum*, *Cheilanthes bergiana*, *C. eckloniana*, *Freesia andersoniae*, *Haemanthus humilis* subsp. *humilis*, *Oxalis depressa*, *Pellaea calomelanos*.
- » **Succulent Herbs:** *Aloe grandidentata*, *Crassula nudicaulis*, *Duvalia caespitosa*, *Euphorbia pulvinata*, *Huernia piersii*, *Stapelia grandiflora*, *S. olivacea*, *Tridentea gemmiflora*.

### Endemic Taxa:

- » **Small Tree:** *Cussonia* sp. nov. (P.J. du Preez 3666 BLFU).

» **Succulent Shrubs:** *Euphorbia crassipes*, *Neohenricia sibbettii*, *N. spiculata*.

Conservation:

About 5% is statutorily conserved in the Rolfontein, Tussen Die Riviere, Oviston, Gariiep Dam, Caledon, and Kalkfontein Dam Nature Reserves. In addition, a small patch is also protected in the private Vulture Conservation Area. About 3% of the area has been lost through building of dams. Erosion varies from low to high.

This karoo unit occurs on the slopes and plateau areas on tafelbergs. As this vegetation type is widespread and largely untransformed the floral species found on the site are not at significant risk of negative impact from the development.

Based on 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 <i>et al.</i> 2005; Mucina <i>et al.</i> , 2006	National Ecosystem List (NEM:BA)
Northern Upper Karoo	21	0	4	Least Threatened	Not listed
Besemkaree Koppies Shrubland	28	5	3	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. Protected Areas and Proposed Protected Areas**

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The PAOI overlaps with NP and PP ecosystems

The proposed Carolus EGI is not located within a protected area, nor does it overlap with any NPAES Focus Areas. The De Aar Nature Reserve is located approximately 11 km to the west, thereby located outside the 5 km buffer zone. The Senqu Caledon NPAES Focus Area is located approximately 10 km to the north-east of the site. The proposed development is therefore unlikely to negatively impact the ecological condition of these landscape features.

## **iii. Plant Species Recorded in the Study Area**

A total of 53 species, representing 24 families were recorded within the PAOI during the survey period. Six of these species are endemic to South Africa, accounting for 11% of the total number of recorded species. None of the species recorded are regarded as SCC. Nevertheless, nine of the species recorded are protected by provincial legislation and if granted authorisation, it is imperative that a Plant Search and Rescue be undertaken prior to clearing and development. This is relatively diverse for an arid environment.

## **iv. 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.

## **v. Trees Protected in Terms of the National Forests Act**

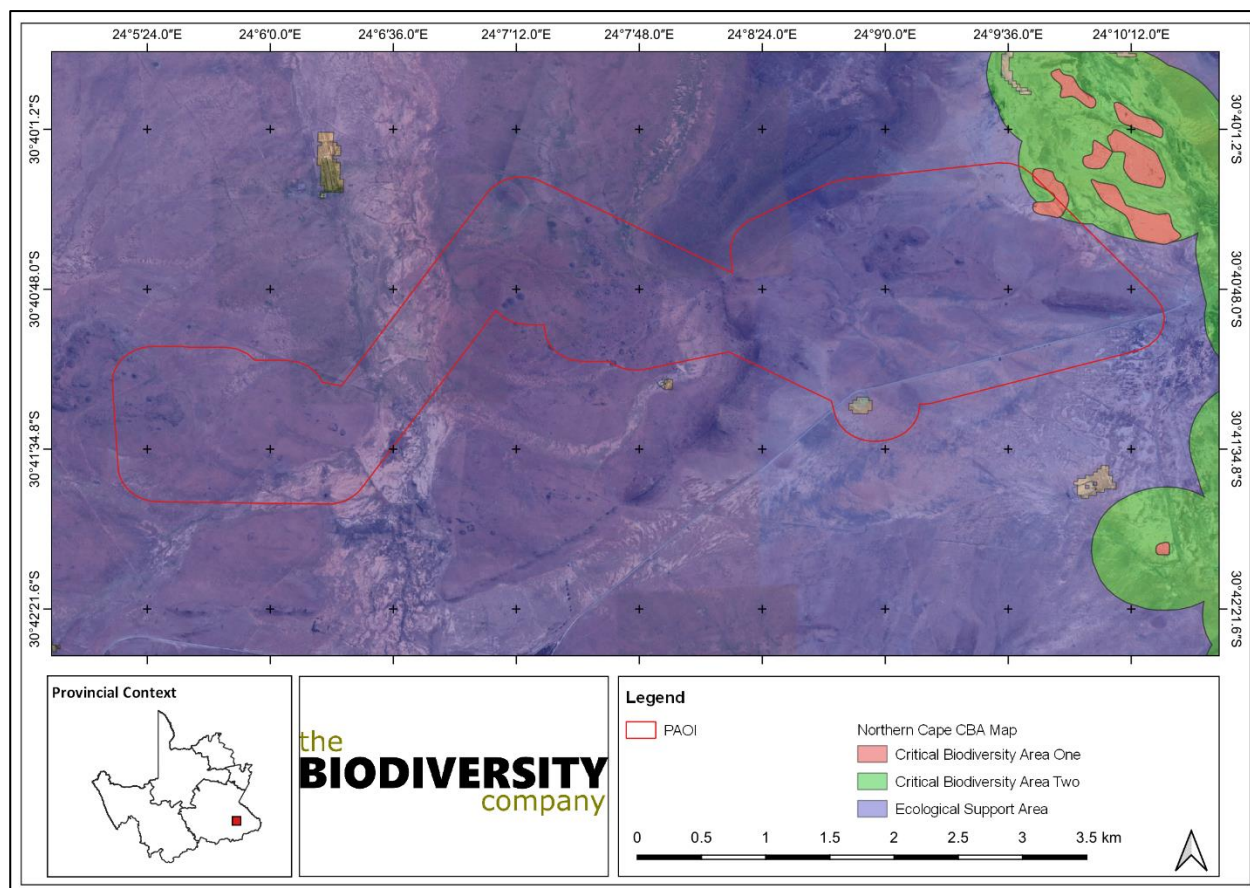
The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localised habitats. Geophytes (bulbs) are often abundant. Frosts, fire, and grazing maintain the grass dominance and prevent the establishment of trees.

## **vi. Critical Biodiversity Areas and Ecological Support Areas**

The Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform 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 6.10** shows the project area superimposed on the Terrestrial CBA map. The project area overlaps with the following areas:

- » **Ecological Support Areas:** The proposed development overlaps with an Ecological Support Area. The nature of the development, i.e., a substation, power line and access roads, will lead to destruction of the Ecological Support Areas and consequently, the footprint area will no longer be congruent with an Ecological Support Area.
- » **Other Natural Areas:** No remaining areas on site are indicated as being in a natural state (Other Natural Area).



**Figure 6.10:** Map illustrating the locations of CBAs in the project area

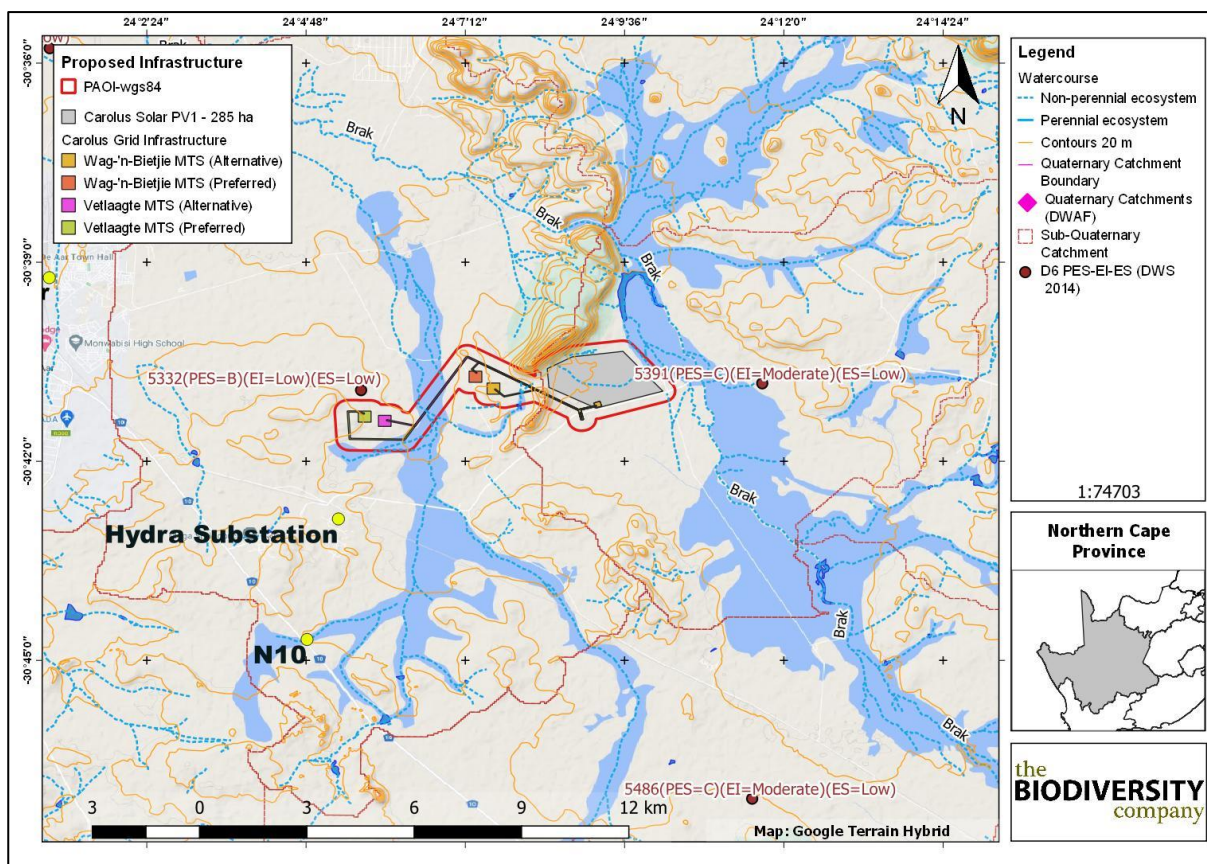
**vii. Wetlands and Freshwater Resources**

**Catchment**

The project area is located in the Brak River D62D quaternary catchment, within the Orange Water Management Area (WMA 6) (NWA, 2016), and Nama Karoo Ecoregion (Kleynhans *et al.*, 2005). The main watercourse that drains the project area is the upper reaches of the Brak River [Sub-Quaternary Reaches (SQRs D62D-5391 and D62D-5332)], a non-perennial river system with an associated low-density network of non-perennial and ephemeral tributaries falling directly within the project area footprint. The Brak River is located immediately east of the project area and approximately 1.5 km downslope of the eastern most portion of the Carolus PV area.

The proposed Carolus PV area is blindly drained (inconspicuous channel) by a single unnamed ephemeral/secondary non-perennial watercourse draining eastwards into the Brak River. The 132 kV powerline extends from the Carolus PV area in the Brak SQR D62D-5391, across a watershed and into the

catchment of a tributary of the Brak River (Brak tributary SQR D62D-5332). The power line infrastructure and all alternatives traverse an unnamed ephemeral/secondary non-perennial watercourse network (Western Tributary) draining in a south-westerly direction into the Brak tributary (**Figure 6.11**).



**Figure 6.11:** Illustration of the watercourses and catchments associated with the project area

**National Freshwater Ecosystem Priority Area Status**

To better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals. **Figure 6.12** is a map illustrating the NFEPAs for the area surrounding the proposed Carolus EGI.

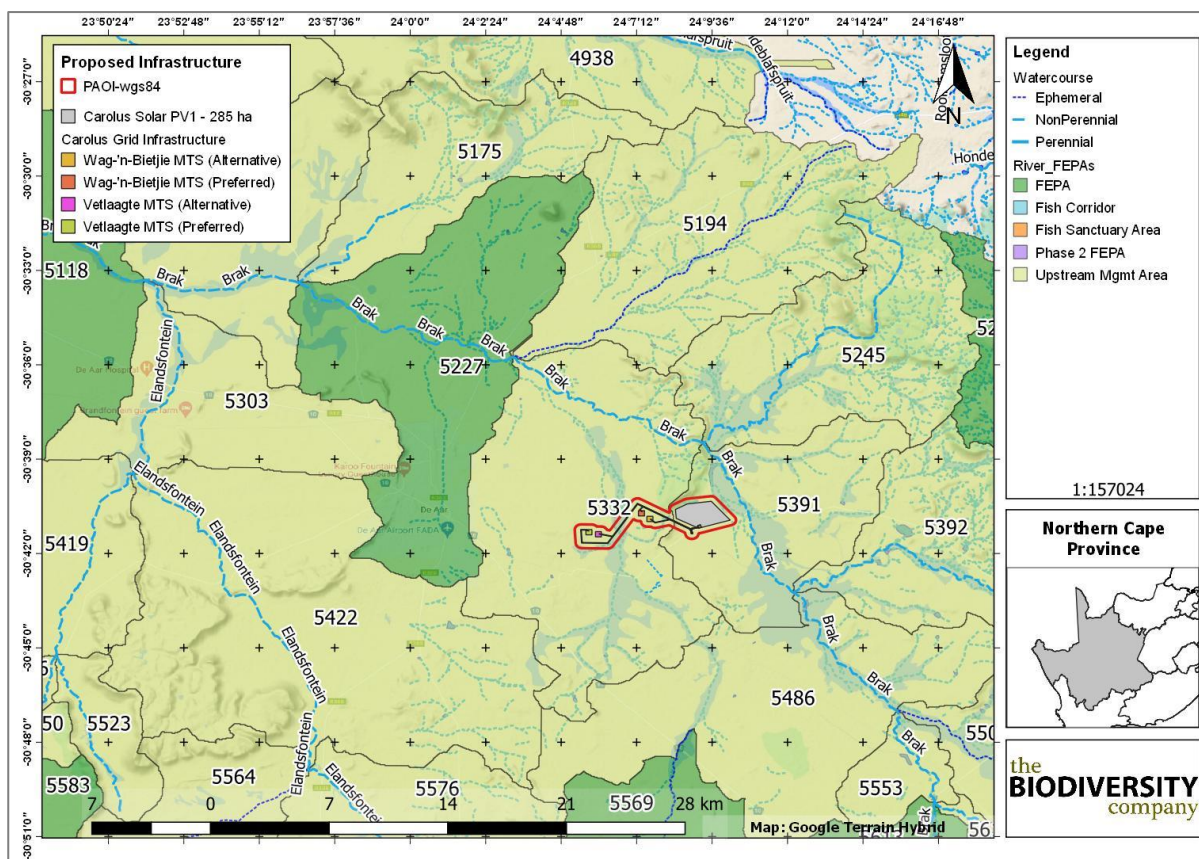


Figure 6.12: NFEPA's for the project area (Nel et al., 2011)

### Aquatic Ecosystems

This spatial dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released as part of the National Biodiversity Assessment (NBA) 2018. National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 2018. According to the SAIIAE dataset, several wetland areas were identified in the general project area, which included several rivers. The wetland units were largely indirectly associated with the project (outside of the 500 m regulated area) warranting no further ecological assessment of the wetland systems for this project, with emphasis rather afforded to the aquatic assessment of the rivers possibly at risk from the proposed project infrastructure.

### ix. Terrestrial Fauna Communities in the Study Area

#### Mammals

The IUCN Red List Spatial Data includes a list of 46 non-volant mammal species that could be found in the area. This list eliminates large mammal species found only in protected areas. Three (3) of the expected species are considered SCC (Table 6.3). A high diversity of large mammal species is not expected due to the presence of anthropogenic activities, notably fragmentation caused by fences, which resulted in just 10 of the expected mammal species being discovered on site. Nevertheless, due to the diversity of habitats on a broad and fine scale, there is a high likelihood of occurrence of other small mammal species occurring within the PAOI.

**Table 6.3:** mammal Species of Conservation Concern (SCC) that are expected to occur within the proposed Carolus EGI.

Family	Genus and species name	Common name	Conservation status
Felidae	<i>Felis nigripes</i>	Black-footed Cat	Vulnerable
Felidae	<i>Panthera pardus</i>	Leopard	Vulnerable
Hyaenidae	<i>Parahyaena brunnea</i>	Brown Hyaena	Near Threatened

### **Amphibians**

Ten amphibian species are expected to occur within the project area based on the IUCN Red List Spatial Data and Amphibian Map database. One of the species is recognized as a SCC. Although the species hasn't been documented in the PAOI, there have been several reports of it in the nearby surroundings.

**Table 6.4:** Amphibian Species of Conservation Concern (SCC) that are expected to occur within the proposed Carolus EGI

Family	Genus and species name	Common name	Conservation status
Pyxicephalidae	<i>Pyxicephalus adspersus</i>	Giant Bullfrog	Near Threatened

### **Reptiles**

Eighteen reptile species are expected to occur within the project area based on the IUCN Red List Spatial Data and the Reptile MAP database. One (1) of the eighteen species is regarded as a SCC. Although the species have not been documented in the PAOI, there have been several reports of it in the nearby surroundings. Six species of reptile were recorded within the PAOI during the survey period, accounting for 33% of the expected species and None of the species recorded are regarded as SCC.

**Table 6.5:** Reptile Species of Conservation Concern (SCC) that are expected to occur within the proposed development

Family	Genus and species name	Common name	Conservation status
Testudinidae	<i>Psammobates tentorius verroxii</i>	Verrox's Tent Tortoise	Near Threatened

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)**

The Platberg-Karoo IBA, within which the proposed Carolus EGI is situated, contributes significantly to the conservation of large terrestrial birds and raptors. These include Blue Crane, Ludwig's Bustard, Kori Bustard, Blue Korhaan, Black Stork, Secretarybird, Martial Eagle, Verreaux's Eagle and Tawny Eagle.

A total of 289 bird species are known to occur in the IBA. IBA trigger species that could potentially occur in the Project Site are the following:

- » Blue Crane (Globally Vulnerable, Regionally Near-threatened)
- » Blue Korhaan (Globally Near-threatened)
- » Martial Eagle (Globally and regionally Endangered)
- » Verreaux's Eagle (Regionally Vulnerable)

- » Ludwig's Bustard (Globally and Regionally Endangered)
- » Secretarybird (Globally Endangered, Regionally Vulnerable)

### **Avifauna Micro-habitats**

The Carolus EGI falls within the Platberg-Karoo Conservancy Important Bird Area (Marnewick et al. 2015). The Platberg-Karoo Conservancy IBA covers the entire districts of De Aar, Philipstown and Hanover, including suburban towns. The landscape consists of extensive flat to gently undulating plains that are broken by dolerite hills and flat-topped inselbergs. The ephemeral Brak River flows in an arc from south-east to north-west, eventually feeding into the orange River basin. Other ephemeral rivers include the Hondeblaf, Seekoei, Elandsfontein and Ongers rivers with a network of tributaries. Vanderkloof Dam is on the north-eastern boundary (Marnewick et al. 2015). This IBA is in the Nama Karoo and Grassland Biomes. The eastern Nama Karoo has the highest rainfall of all the Nama Karoo vegetation types and is thus ecotonal to grassland, with a complex mix of grass- and shrub-dominated vegetation types (Marnewick et al. 2015).

The land is used primarily for livestock grazing and agriculture. Commercial livestock farming is mostly extensive wool and mutton production, with some cattle and game farming. Less than 5% of this IBA is cultivated under dry-land or irrigated conditions and includes lucerne and prickly pear *Opuntia ficus-indica* orchards (Marnewick et al. 2015).

#### Nama Karoo Shrubland

The main vegetation type within the development areas consists of Karoo shrubland with a strong grassy component.

#### Drainage Lines and Wetlands

There is a large riverine and wetland system in the north/north-eastern corner of the Project Site. This habitat feature is most likely very important feeding, breeding, and nesting habitat for several priority and non-priority species, especially waterbirds. It should be noted that this riverine system falls outside of the proposed Development Areas.

#### Alien Trees

The Carolus EGI project site is generally devoid of trees, except for isolated clumps of trees at homesteads and boreholes, where a mixture of alien and indigenous trees is growing. The trees could attract a variety of bird species for the purposes of nesting and roosting.

#### High Voltage Lines

High voltage lines are an important potential roosting and breeding substrate for large raptors in the Karoo (Jenkins et al. 2013). A high voltage line bisects the Carolus EGI project site. There is increasing evidence that vultures are using high voltage lines in the Karoo (personal observation), mostly in the non-breeding season (January to March), and that they could be encountered anywhere in the broader area.

### **Bird Community within the Surrounding Area and the larger Pixley Park Project Site**

The SABAP2 data indicates that a total of 162 species could potentially occur within the broader area where the project is located (see Appendix 1 of the Avifauna Impact Assessment). Of these, 76 are classified as priority species for solar developments. Of the 76 priority species, 45 have a medium to high probability of occurring regularly in the Project Site, and 21 of the priority species were recorded during the field

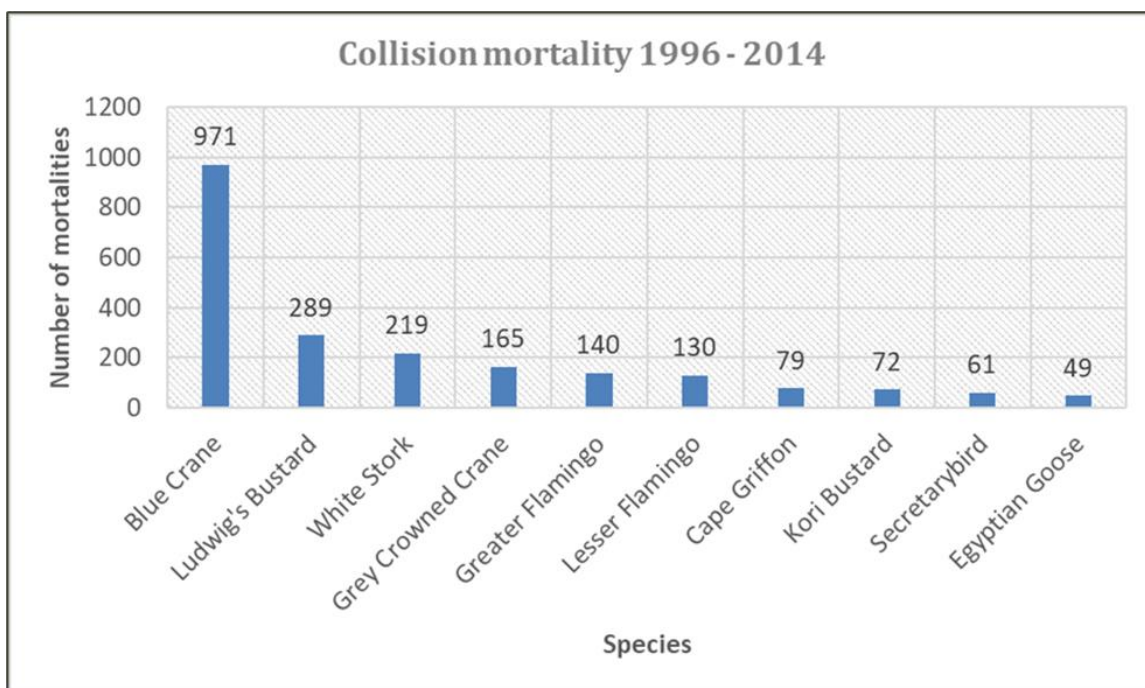
monitoring. Five Red Data species were recorded during the site surveys, namely Cape Vulture (Globally and Regionally Endangered), Lanner Falcon (Regionally Vulnerable), Martial Eagle (Globally and Regionally Endangered), Secretarybird (Globally Endangered, Regionally Vulnerable), and Tawny Eagle (Globally Vulnerable, Regionally Endangered).

**Table 6.7** below lists all the priority species and the possible impact on the respective species by the proposed Carolus EGI.

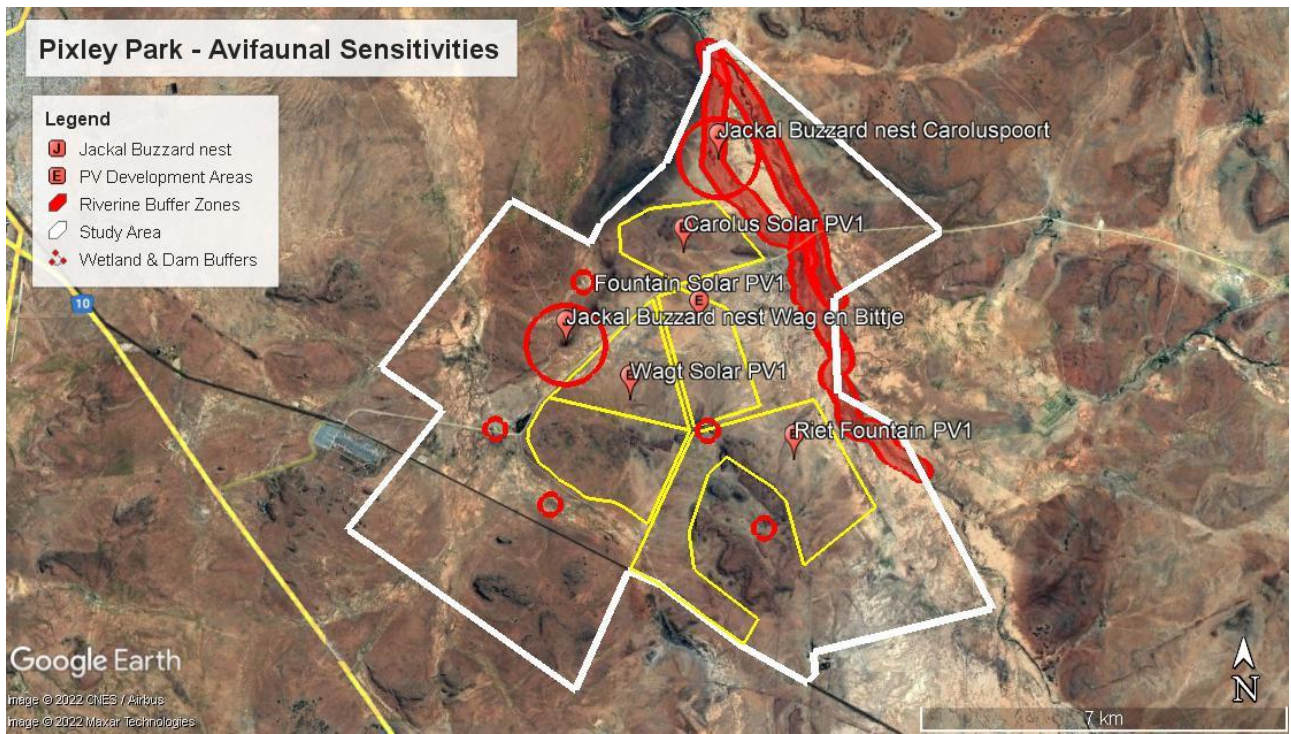
**Site specific collision risk rating**

Collisions are the biggest threat posed by transmission lines to birds in southern Africa (Van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds, and to a lesser extent, vultures. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines (Van Rooyen 2004, Anderson 2001).

From incidental record keeping by the Endangered Wildlife Trust, it is possible to give a measure of what species are generally susceptible to power line collisions in South Africa (Refer to **Figure 6.13**). The avifauna sensitivities identified within the larger Pixley Park Project site are illustrated in **Figure 6.14**. No sensitivities were identified on the Carolus Solar PV1 project, or along the proposed grid connection corridors.



**Figure 6.13:** The top 10 collision prone bird species in South Africa, in terms of reported incidents contained in the Eskom/Endangered Wildlife Trust Strategic Partnership central incident register 1996 - 2014 (EWT unpublished data)



**Figure 6.14:** Avifaunal Sensitivities 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	SABAP2 Reporting Rate (%)		Global Conservation Status	Regional Conservation Status	Endemic (SA)	Recorded during monitoring	Likelihood of regular occurrence in Project Site	Nama Karoo shrub	Drainage lines and wetlands	Water reservoirs and dams	High voltage lines	Alien trees	Rocky ridges	Solar - Collisions with solar panels	Solar - Displacement: Disturbance (breeding)	Solar - Displacement: Habitat transformation	Solar - Entanglement in fences	Substations - Electrocutation	Powerline - Collision
		Full protocol	Ad hoc protocol																	
African Sacred Ibis	Threskiornis aethiopicus	55,0	3,4	-	-			H		x	x									x
Amur Falcon	Falco amurensis	15,0	6,9	-	-		x	M	x			x	x	x			x		x	
Black Stork	Ciconia nigra	10,0	0,0	-	VU			M		x	x			x						x
Black-chested Snake Eagle	Circaetus pectoralis	5,0	0,0	-	-			M	x			x	x				x		x	
Black-headed Heron	Ardea melanocephala	20,0	0,0	-	-			M		x	x		x				x		x	x
Blacksmith Lapwing	Vanellus armatus	55,0	3,4	-	-			H		x	x				x					
Black-winged Kite	Elanus caeruleus	10,0	0,0	-	-			M	x			x	x	x			x		x	
Black-winged Stilt	Himantopus himantopus	35,0	6,9	-	-			M		x	x				x					
Blue Crane	Grus paradisea	45,0	6,9	VU	NT			H	x	x						x	x	x		x
Blue Korhaan	Eupodotis caerulescens	15,0	6,9	NT	LC	x		M	x						x	x	x	x		x
Booted Eagle	Hieraaetus pennatus	15,0	3,4	-	-		x	M	x			x	x	x			x		x	
Cape Teal	Anas capensis	15,0	0,0	-	-			M		x	x				x					x
Cape Vulture	Gyps coprotheres	5,0	0,0	EN	EN		x	M	x		x	x		x		x	x		x	x
Cape White-eye	Zosterops virens	20,0	0,0	-	-	x		M					x							
Common Buzzard	Buteo buteo	10,0	6,9	-	-			M	x		x	x	x	x		x	x		x	
Common Greenshank	Tringa nebularia	15,0	0,0	-	-			M		x	x				x					

Species name	Scientific name	SABAP2 Reporting Rate (%)		Global Conservation Status	Regional Conservation Status	Endemic (SA)	Recorded during monitoring	Likelihood of regular occurrence in Project Site	Nama Karoo shrub	Drainage lines and wetlands	Water reservoirs and dams	High voltage lines	Alien trees	Rocky ridges	Solar - Collisions with solar panels	Solar - Displacement: Disturbance (breeding)	Solar - Displacement: Habitat transformation	Solar - Entanglement in fences	Substations - Electrocutation	Powerline - Collision
		Full protocol	Ad hoc protocol																	
Common Moorhen	<i>Gallinula chloropus</i>	25,0	0,0	-	-			M		x	x				x					
Egyptian Goose	<i>Alopochen aegyptiaca</i>	60,0	13,8	-	-		x	H		x	x	x	x		x		x		x	x
Fiscal Flycatcher	<i>Melaenornis silens</i>	15,0	6,9	-	-	x		M					x							
Glossy Ibis	<i>Plegadis falcinellus</i>	30,0	0,0	-	-			M		x	x				x					x
Greater Kestrel	<i>Falco rupicoloides</i>	10,0	17,2	-	-		x	M	x			x	x	x		x	x		x	
Grey Heron	<i>Ardea cinerea</i>	20,0	0,0	-	-			M		x	x				x					x
Jackal Buzzard	<i>Buteo rufofuscus</i>	10,0	10,3	-	-	x	x	H	x			x	x	x		x	x		x	
Karoo Lark	<i>Calendulauda albescens</i>	10,0	0,0	-	-	x		M	x						x	x	x			
Karoo Prinia	<i>Prinia maculosa</i>	25,0	3,4	-	-	x	x	M	x	x					x	x	x			
Karoo Thrush	<i>Turdus smithi</i>	50,0	3,4	-	-	x		M					x				x			
Lanner Falcon	<i>Falco biarmicus</i>	10,0	3,4	-	VU		x	M	x		x	x	x	x		x	x		x	
Large-billed Lark	<i>Galerida magnirostris</i>	30,0	13,8	-	-	x	x	H	x						x	x	x			
Lesser Kestrel	<i>Falco naumanni</i>	55,0	6,9	-	-		x	H	x			x	x	x			x		x	
Little Stint	<i>Calidris minuta</i>	10,0	0,0	-	-			M		x	x				x					
Ludwig's Bustard	<i>Neotis ludwigii</i>	25,0	0,0	EN	EN			M	x							x	x	x		x
Martial Eagle	<i>Polemaetus bellicosus</i>	5,0	3,4	EN	EN		x	M	x		x	x	x	x			x		x	
Pale Chanting Goshawk	<i>Melierax canorus</i>	50,0	13,8	-	-		x	H	x			x	x	x			x		x	
Pied Avocet	<i>Recurvirostra avosetta</i>	20,0	0,0	-	-			M		x	x				x					

Species name	Scientific name	SABAP2 Reporting Rate (%)		Global Conservation Status	Regional Conservation Status	Endemic (SA)	Recorded during monitoring	Likelihood of regular occurrence in Project Site	Nama Karoo shrub	Drainage lines and wetlands	Water reservoirs and dams	High voltage lines	Alien trees	Rocky ridges	Solar - Collisions with solar panels	Solar - Displacement: Disturbance (breeding)	Solar - Displacement: Habitat transformation	Solar - Entanglement in fences	Substations - Electrocutation	Powerline - Collision
		Full protocol	Ad hoc protocol																	
Pied Starling	Lamprotornis bicolor	40,0	6,9	-	-	x		H	x		x		x		x	x	x			
Rock Kestrel	Falco rupicolus	20,0	3,4	-	-			M	x					x		x	x		x	
Ruff	Calidris pugnax	15,0	0,0	-	-			M		x	x				x					
Secretarybird	Sagittarius serpentarius	5,0	10,3	EN	VU		x	M	x		x					x	x	x		x
Sickle-winged Chat	Emarginata sinuata	10,0	6,9	-	-	x	x	M	x						x	x	x			
South African Cliff Swallow	Petrochelidon spilodera	40,0	0,0	-	-	x		H	x								x			
South African Shelduck	Tadorna cana	30,0	6,9	-	-			H		x	x				x					x
Spotted Eagle-Owl	Bubo africanus	5,0	0,0	-	-			M		x			x	x	x	x	x	x	x	
Spur-winged Goose	Plectropterus gambensis	35,0	3,4	-	-		x	M		x	x				x		x			x
Three-banded Plover	Charadrius tricollaris	45,0	6,9	-	-			H		x	x				x					
Yellow-billed Duck	Anas undulata	20,0	3,4	-	-		x	M		x	x				x					x

## 6.5 Visual Quality

The study area occurs on land that ranges in elevation from approximately 1,230m above sea level (along the Brak River to the north-west) to 1,560m at the top of the hill north-west of the properties. The terrain surrounding the proposed properties is generally flat, sloping gently to the north and south-west towards the Brak River. A few farm dams are present in the broader area.

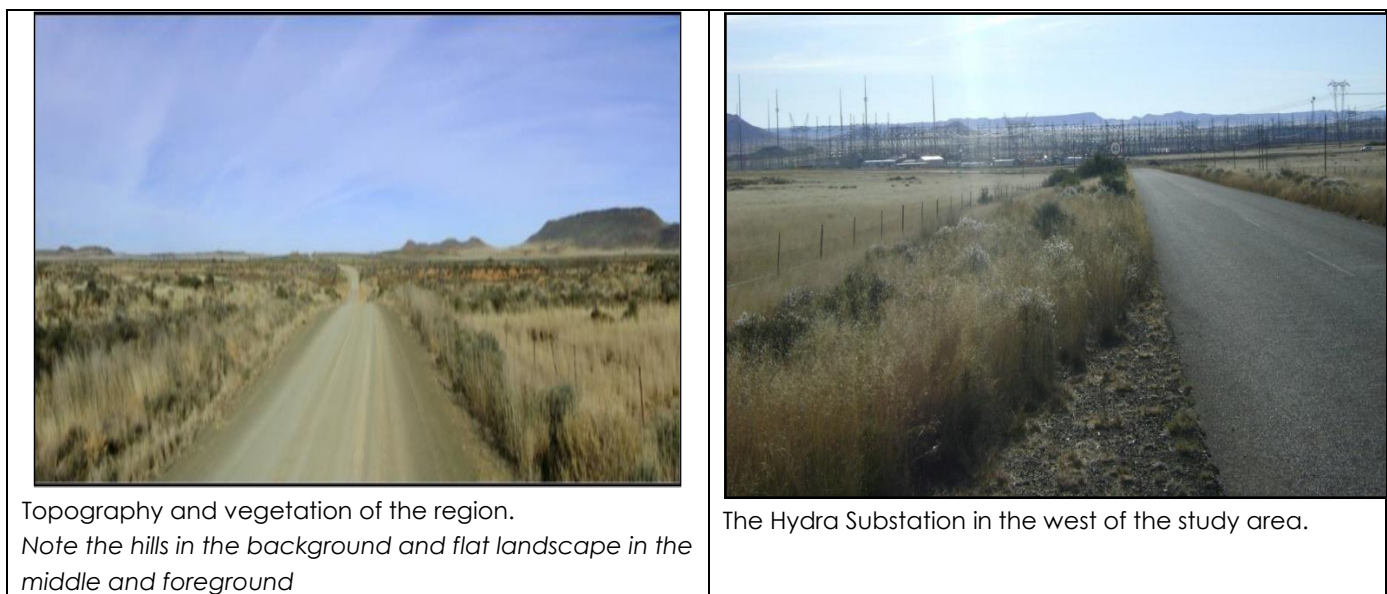
The terrain type of the region is relatively homogenous and is described as predominantly lowlands with hills. Some prominent hills and ridges occur in the study area - a small range of hills lies along the north-western border of the properties.

De Aar is a primary commercial distribution centre for a large area of the central Great Karoo. Major economic activities of the area include wool production and livestock farming. The area is also popular for hunting.

The study area is sparsely populated outside of the De Aar urban area (i.e. less than two people per km<sup>2</sup> within the district municipality). De Aar is the third largest town in the Northern Cape with a population density of 30-100 people per km<sup>2</sup>. In addition to De Aar, a number of isolated homesteads occur throughout the study area.

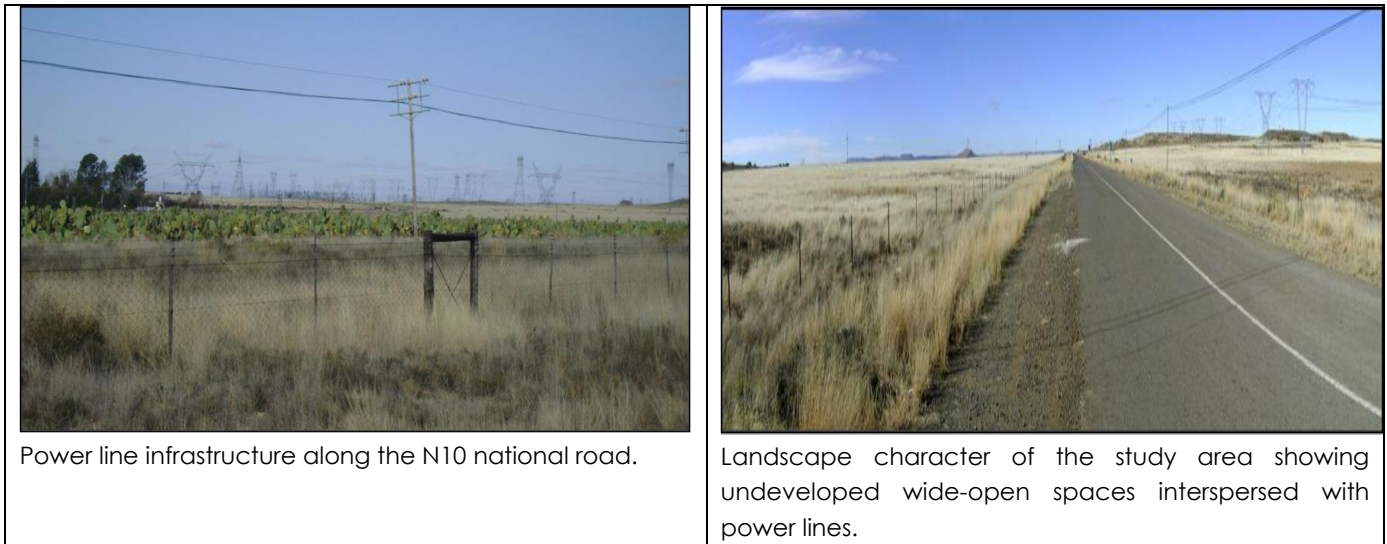
The N10 national road traverses the study area from the N1 national road (near Hanover) to De Aar. Rail infrastructure is prominent in the area, with De Aar representing the second most important railway junction in South Africa. Other industrial infrastructure within the study area includes the Hydra (to the south west of the proposed alignment) and Bletterman Substations. The Hydra Substation road provides access to the Pixley Park properties from the N10 national road. There is a significant network of power lines extending in all directions from these substations.

The photographs below aid in describing the general environment within the study area and surrounding the proposed project infrastructure.



Topography and vegetation of the region.  
*Note the hills in the background and flat landscape in the middle and foreground*

The Hydra Substation in the west of the study area.



**Figure 6.15:** Photographs showing the general environment within the area.

The potential visual exposure (visibility) of the EGI is shown in **Figure 6.15**. The visibility analyses were undertaken from the proposed power line alignment at 30m above ground level (i.e., the approximate maximum height of the power line towers). The viewshed analyses were restricted to a 3km radius due to the fact that visibility beyond this distance is expected to be negligible/highly unlikely for the relatively constrained vertical dimensions of this type of infrastructure (i.e., a 132kV power line).

It is expected that the EGI may theoretically be visible within the 3km visual corridor and potentially highly visible within a 0.5km 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. The EGI are unlikely to be visible beyond a 3km radius of the structures. It should also be noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing power lines and Hydra substation within the study area.

It is expected that the power line structure and substations (both preferred and the alternatives) would be highly visible within a 0.5 Km radius. There are no residences within this zone. There is a section of the secondary road that traverses the site passing the Hydra substation and the Wag 'n Bietjie homestead. Observers travelling along this road will be exposed to the project infrastructure.

Potential visual exposure in the short to medium distance (i.e., between 0.5 and 1.5km), is still highly concentrated, with small pockets of visually screened areas to the north west of the proposed alternative Vetlaagte MTS and north of the start of the alignment.

The potential sensitive visual receptors within this zone include residents of Vetlaagte and users of the secondary road. The rest of the visually exposed areas fall within vacant farmland and open space generally devoid of potential sensitive visual receptors.

In general terms it is envisaged that the grid connection infrastructure, where visible from shorter distances (e.g. less than 0.5km and potentially up to 1.5km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be low, due to the generally remote location of the proposed infrastructure and the low number of potential observers. It should once again be

noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing power lines and Hydra substation in the study area.

The potential visual exposure for the Preferred and three (3) other Alternatives is expected to be very similar in extent owing to the fact that all alternatives follow along the Preferred Alternatives route and impact on the same potential sensitive visual receptors.

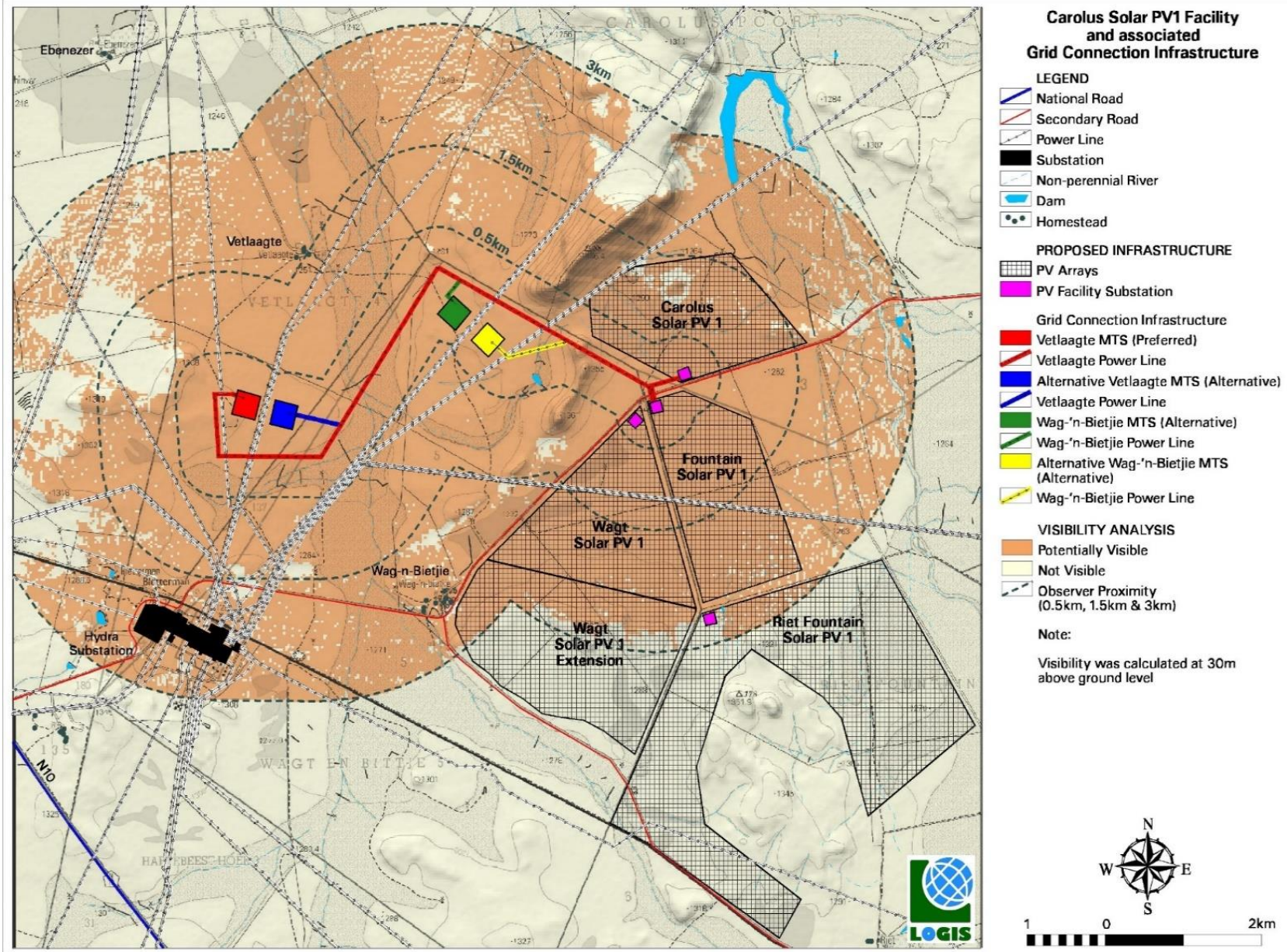


Figure 6.16: Viewshed analysis of the proposed grid connection infrastructure.

## 6.6 Heritage Profile

### 6.6.1 Archaeology

As part of the 2012 process for approval of the Vetlaagte Solar Energy Facility located immediately adjacent to the proposed development area, Kruger conducted a detailed Heritage Impact Assessment of the area. According to Kruger (2012), *"During the survey, widespread Middle Stone Age (MSA) material, including characteristic formal MSA stone tools such as points, blades and scrapers were documented in the survey area along a north-south oriented drainage on the (western) periphery of the property. The lithic remains occur in three large scatters and, almost without exception, in low lying areas along non-perennial drainage lines and wetland areas where precipitation and groundwater have exposed the stone tools, originally deposited on a decomposed calcrete rock layer approximately 30cm sub surface. Preliminary examinations of some of the lithics indicated that a number of flakes displayed faceted platforms, characteristic of the MSA."* Part of the study area for the Wag 'n Bietjie development assessed in this report is located within the drainage described above. It is therefore likely that the proposed development will impact on significant MSA archaeology. Kruger (2012) also documented historical period remains, *"specifically the old Vetlaagte homestead with restored farmhouse, outbuildings, midden and labourers' quarters, as well as a dilapidated dam wall constructed in the drainage line east of the farmstead are present on the property. The date of construction of the farm house is denoted by a year count ("1930") on the front gable of the structure. The entire farmstead is situated in an area excluded from the solar farm development. A small family graveyard, associated with the farmstead at Vetlaagte, also occurs in the exclusion zone about 100m north of the farm house."*

In his assessment of areas adjacent to this proposed development, Orton (2012) found that *"All the archaeological finds on Badenhorst Dam Farm were pre-colonial, but nevertheless, different types were present. This farm also had areas with artefacts best described as being 'background scatter'. The grass cover, however, meant that fewer such areas were identified. Most were in open, silty patches that clearly hold water in the rainy season..."*

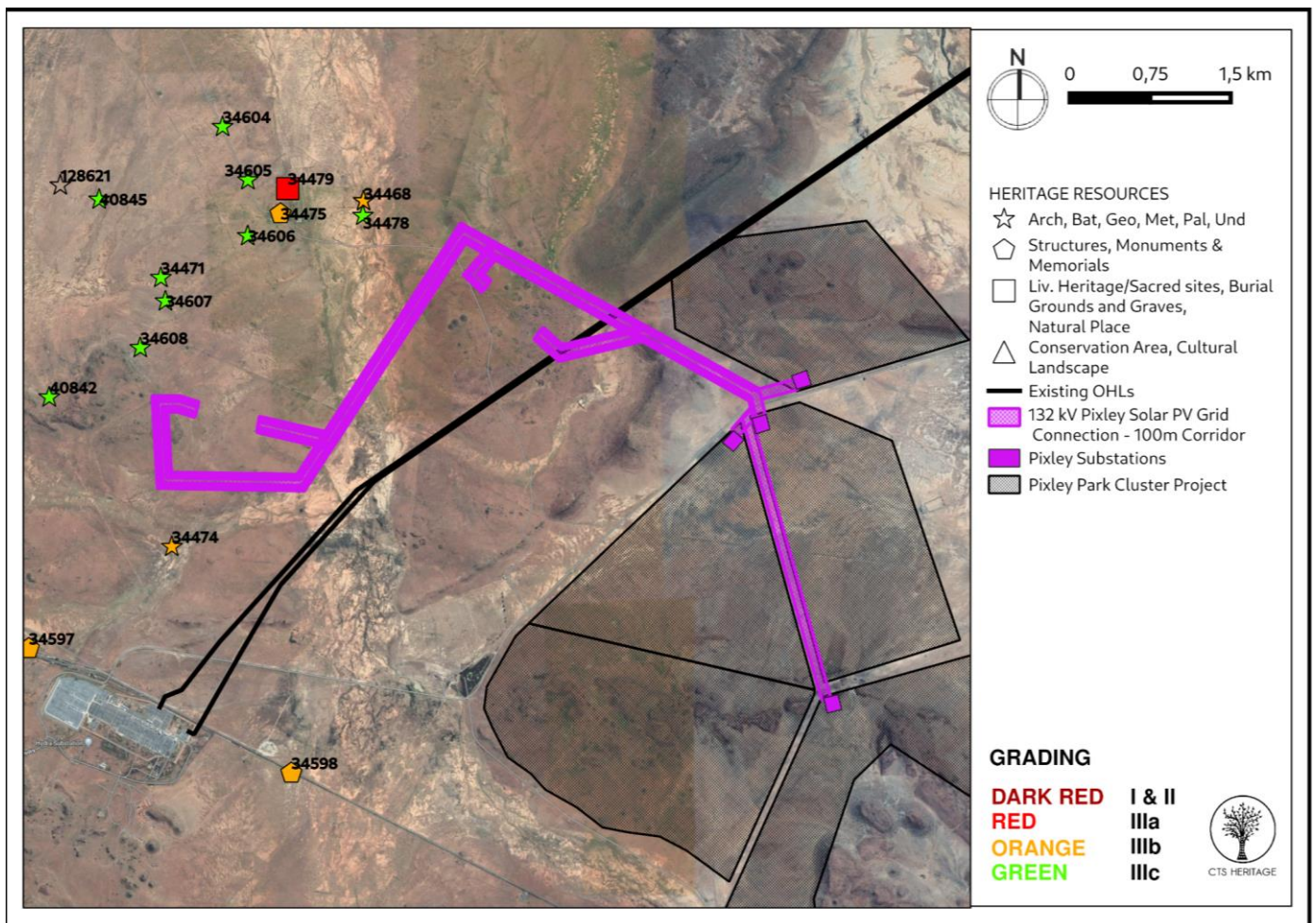
Orton (2012) found LSA artefacts associated with the ridge running through the property that he assessed, and MSA artefacts from a pan-like area. He noted that *"the artefacts in the flatter areas here appeared to be of much lower density and far fewer occurrences were recorded. However, stone artefact scatters with spatial integrity were more common. These were predominantly LSA and very much focused on the rocky ridges crossing the farm."* Orton (2012) noted that the spatially constrained scatters of artefacts that he identified *"are almost certain to indicate places where people camped and the durable stone artefacts are now all that remains as evidence. It is also notable that their locations are not random – they are placed on level areas and saddles along the ridges."*

*One of these LSA scatters, DAR2011/019 (#026) included a thumbnail scraper indicative of a mid- to late Holocene age. Some of the artefacts here were very black and shiny indicating recent flaking and deposition."* Orton (2012) also identified a number of piled stone structures. These appeared to be concentrated on one particular dolerite ridge and, unlike those from elsewhere in the Karoo, only one may have been a kraal. He determined that these structures are likely to be pre-colonial in age as similar piles have been recorded in an almost certain pre-colonial context in the Seacow River valley (Hart 1989). Orton (2012) also identified a number of engraved rocks that date to the LSA and historical times. All of Orton's findings (2012) are mapped in Figure 3 and 3b of the Heritage Impact Assessment Report (Appendix H of this report). While these resources fall outside of this development area, they give an indication of the likely



archaeological sensitivity of the development area under consideration in this assessment. A recent field assessment on an adjacent farm conducted by CTS Heritage found that "The overall archaeological sensitivity of the development area with regard to the preservation of Early, Middle and Later Stone Age archaeology as well as Khoe and San heritage, early colonial settlement is regarded as very high. Despite this, the field assessment conducted for this project has demonstrated that the specific area proposed for development has low sensitivity for impacts to significant archaeological heritage." The report goes on to note that "Two sites warranted protection with an interesting scatter of Still Bay tools on top of a dolerite outcrop with excellent views of the surrounding area. It is highly unlikely this area will be developed and it is recommended that infrastructure is not placed on this outcrop. Another site was found warranting a IIIB rating with pottery, bone and an extensive stone tool assemblage amongst the dolerite outcrops on the eastern end of the property. Again, this site has been demarcated as sensitive and the project team has been advised to avoid this area when finalising the layouts.

A minimum buffer of 100m is recommended from this site (Wag n Bietjie 014). The rest of the observations are typical of the area and are ubiquitously distributed in low densities of less than 5 artefacts per observation." Similar heritage resources are likely to be located within the area proposed for development. **Table 6.8** lists the archaeological heritage finds and **Figure 6.17** provides a locality map of the archaeological and heritage resources identified within the grid connection corridor and substation footprint.



**Figure 6.17:** Map of archaeological observations in proximity to the proposed development area

**Table 6.8:** Observations made during the archaeological field assessment within Carolus EGI

Site No.	Site Name	Description	Density m2	Period	Co-ordinates		Grading	Mitigation
076	Grid	Hornfels blade, edge retouched	0 to 5	MSA	-30.68882022	24.14215164	NCW	NA
077	Grid	Early MSA siltstone flake edge retouched	0 to 5	MSA	-30.68839403	24.13644379	NCW	NA
078	Grid	Old farm dam, earthen	n/a	Modern	-30.68789437	24.13177839	NCW	NA
079	Grid	Hornfels core and flake, edge retouched	0 to 5	MSA	-30.68242723	24.11585108	NCW	NA
<b>Other fieldwork conducted</b>								
004		<b>Still bay point, blades, hornfels, burnt bone, on top of dolerite outcrop with good views</b>	<b>5-10</b>	<b>MSA</b>	<b>-30.68097</b>	<b>24.11972</b>	<b>IIIC</b>	<b>30m no-go buffer</b>
006	Grid	Single long hornfels blade flake retouched near windmill	0-5	MSA	-30,67512	24,1188	NCW	NA
007	Grid	Two unworked hornfels flakes	0-5	MSA	-30,6751	24,12113	NCW	NA
008	Grid	Hornfels flake, unworked, heavily patinated	0-5	MSA	-30,67872	24,12576	NCW	NA
009	Grid	Hornfels core	0-5	MSA	-30,67845	24,12653	NCW	NA
010	Grid	Heavily patinated hornfels flakes in a small clearing	0-5	MSA	-30,67832	24,12772	NCW	NA
011	Grid	Three hornfels flakes, one with edge retouch	0-5	MSA	-30,67847	24,12838	NCW	NA
012	Grid	Thumbnail scraper, msa hornfels blade and flakes	10-30	MSA, LSA	-30,67917	24,12871	NCW	NA
013	Grid	Hornfels point, edge retouched	0-5	MSA	-30,68179	24,12737	NCW	NA
014	Grid	<b>LSA and MSA site with mainly LSA hornfels flakes and pottery</b>	<b>30+</b>	<b>MSA, LSA</b>	<b>-30.68296</b>	<b>24.12708</b>	<b>IIIB</b>	<b>100m no go buffer</b>
016	Grid	heavily patinated hornfels blade retouched	0-5	MSA	-30,68002	24,11668	NCW	NA
017	Grid	Unworked siltstone and hornfels flakes	0-5	MSA	-30,67955	24,11629	NCW	NA
019	Grid	Hornfels chunks in edge of pan	0-5	LSA	-30,68099	24,11445	NCW	NA
020	Grid	Large hornfels point, and flake	0-5	MSA	-30,6824	24,11505	NCW	NA
025	Grid	hornfels bladelet with hinge terminations on dorsal, hornfels core with less than 10% cortex left	0-5	MSA	-30,68546	24,11078	NCW	NA
028	Grid	Small hornfels point with hafted platform retouch	0-5	MSA	-30,68891	24,10134	NCW	NA

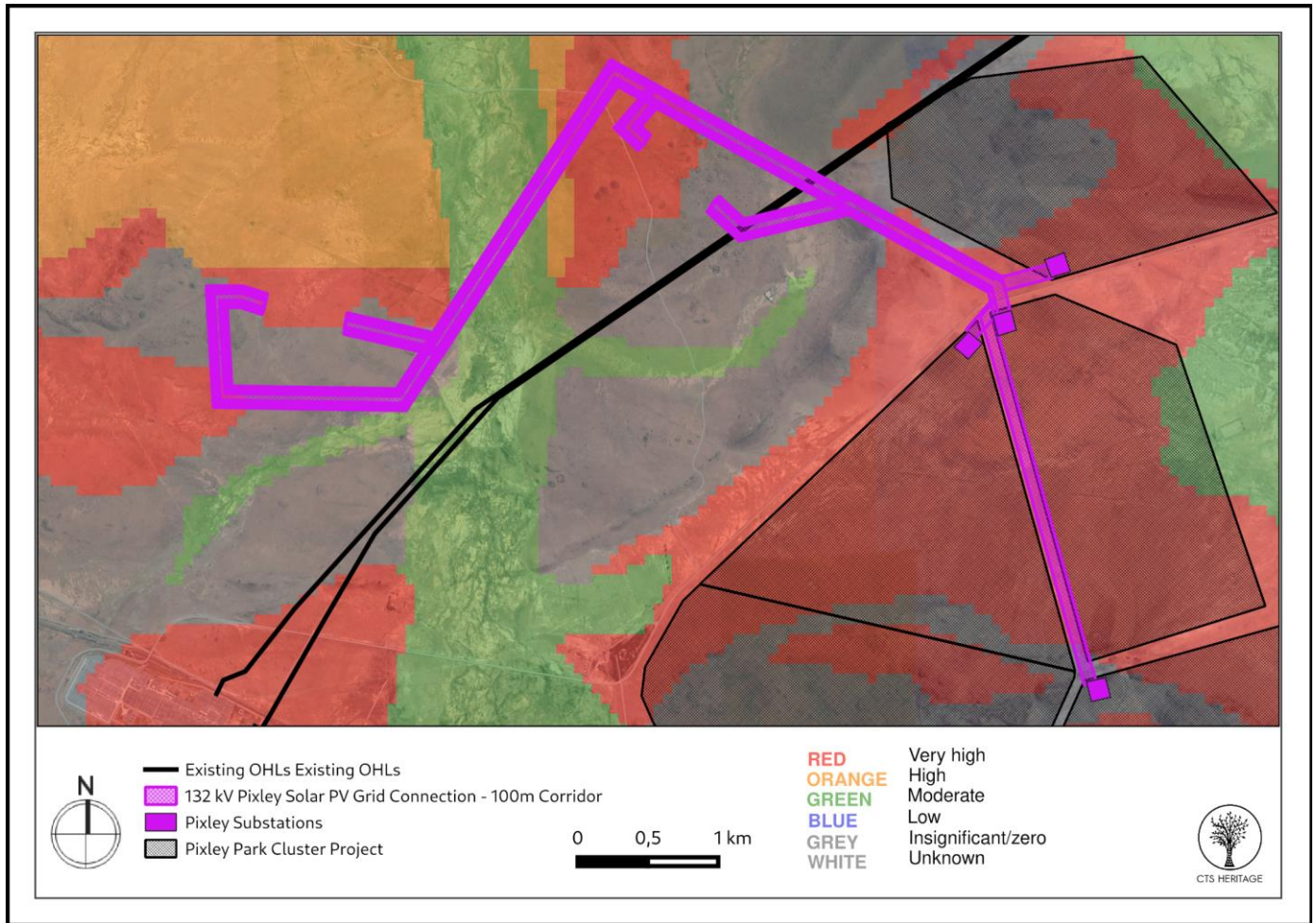
Site No.	Site Name	Description	Density m2	Period	Co-ordinates		Grading	Mitigation
029	Grid	Two heavily patinated hornfels flakes near low dolerite outcrop	0-5	MSA	-30,68995	24,10013	NCW	NA
033	Grid	Hornfels flake with very finely struck secondary scars on dorsal	0-5	MSA	-30,68823	24,09485	NCW	NA
035	Grid	Two hornfels flakes in amongst dolerite outcrops	0-5	MSA	-30,68906	24,09129	NCW	NA
037	Grid	Hornfels flakes, segment	0-5	MSA	-30,69021	24,09002	NCW	NA
039	Grid	Hornfels flakes, one retouched all around, triangular point	0-5	MSA	-30,69163	24,09172	NCW	NA
047	Grid	Hornfels flakes in jeep track	0-5	MSA	-30,68724	24,09022	NCW	NA

## 6.6.2 Palaeontology

According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments of moderate, high, and very high paleontological sensitivity. The Council for GeoSciences Map 3024 for Colesburg, states that the development area is underlain by Jurassic Dolerite, the Tierberg Formation of the Eccca Group and the Adelaide Subgroup of the Beaufort Group as well as Quaternary sands associated with the drainage lines.

As part of the process completed in 2012 for the approved neighbouring Vetlaagte Solar Energy Facility, a field-based palaeontological assessment was undertaken. In this assessment it was found that the potentially fossiliferous sediments of the Late Palaeozoic Karoo Supergroup (Eccca and Lower Beaufort Groups) that underlie the study area are almost entirely mantled in a thick layer of superficial deposits of probable Pleistocene to Recent age. These include various soils, gravels and – at least in some areas - a well-developed calcrete hardpan. The upper Eccca Group bedrocks in the northern portion of the study area contain locally abundant fossil wood (of palaeontological interest for dating and palaeoenvironmental studies), as well as low diversity non-marine trace fossil assemblages typical of the Waterford Formation, rather than the Tierberg Formation as mapped. No vertebrate fossils and only scattered woody plant impressions of the Permian Glossopteris Flora were observed within the Lower Beaufort Group rocks that are very poorly exposed in the southern portion of the Vetlaagte study area. Trace fossils, silicified wood and rare vertebrate remains (therapsids, parareptiles) of the Middle Permian Pristerognathus Assemblage Zone have recently been recorded from this succession in the De Aar region (Almond 2010b). Extensive dolerite sills and dykes of the Early Jurassic Karoo Dolerite Suite intruding the Karoo Supergroup sediments are entirely unfossiliferous, as are rare intrusive kimberlite pipe rocks of Cretaceous age.

Based on the information from the survey as referred to above the construction of new access roads and transmission lines in this region are likewise considered to be of low significance as far as fossil heritage is concerned. In view of the overall low significance of the proposed development on palaeontological heritage resources, it is concluded that no further palaeontological heritage studies or specialist mitigation are required for these projects, pending the exposure of any substantial fossil remains (e.g., vertebrate bones and teeth, large blocks of petrified wood) during the construction phase."



**Figure 6.18: Palaeontological sensitivity of the area surrounding the broader EGI study area**

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and some do contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils. Almond (2010) found no fossils of significance during his site visit to Vetlaagte, and the Wag 'n Bietjie farm has the same lithology. It is unknown what lies below the surface.

Based on previous surveys in the area, the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be **LOW to MODERATE**.

**6.6.3 Cultural Landscape**

In common with much of Bushmanland, the project area is a flat expanse of relatively flat terrain but with many ephemeral drainage lines visible on aerial photography. From the specialist analysis that have been done it can be suggested that vegetation cover is likely to be always very sparse with the ground surface openly visible in terms of expected heritage resources.

Bushmanland is well known for the vast expanses of gravel that occur in places and which frequently contain stone artefacts in varying densities (Beaumont, 1995). Such material is referred to as 'background

scatter' and is invariably of very limited significance. The development area is "characterised by flat undulating Karoo vegetation comprised of relatively sparse scrub and grasses, with dolerite hills in the surrounding landscape. Large portions of the land are currently devoted to livestock farming but several solar energy facilities are to be constructed on farms around De Aar. Shallow soils cover a combination of calcrete, shale and dolerite substrates, and large sections in the landscape are exposed to sheet erosion, specifically along low lying areas and drainage lines. Dolerite and sandstone are present, while exotic rocks occur in the gravel of the Orange Riverbed and terraces. These provided suitable material for stone tool production during the Earlier, Middle and Later Stone Ages.

The town of De Aar only dates to 1903, just after the cessation of the 1899-1902 Anglo-Boer War, farms were given out and surveyed in the 1800s. The railway junction dates to 1881 when Cape Town and Kimberley were linked by rail after diamonds were discovered at the latter town. It was very important to the British during the Anglo-Boer War since railway lines from Cape Town and Port Elizabeth joined here and extended on through Kimberly to Mafikeng). De Aar was also the site of the first use of wireless telegraphy in South Africa where the British employed it to maintain communications between their various columns operating in the area. The town was laid out around the railway junction on the farm De Aar which was purchased in 1889 by Isaac and Wolf Friedlander, who ran a trading store and hotel at the railway junction. After the war, the brothers established the town. Two Provincial Heritage Sites occur in De Aar. These are the "Olive Schreiner house" and the "St Paul's Church". At least one other building is listed (SAHRA, n.d.). Many of the older buildings in the town are early 20th century, including some art deco, but most of the structures date to the mid- to late 20th century.

## **6.7 Social Profile**

### **6.7.1 Profile of the Broader Area**

The study area is located within the Emthanjeni Local Municipality (ELM), which falls within the Pixley ka Seme District Municipality (PKSDM) in the Northern Cape Province. De Aar is the administrative seat of the EML and PKSDM. The site is located within Ward 6 in the ELM.

#### **Population**

The population of the ELM in 2016 was 45 404. Of this total, 36.4% were under the age of 18, 57.9% were between 18 and 64, and the remaining 5.8% were 65 and older. The ELM therefore has a relatively large young population.

In terms of race groups, Coloureds made up 60.9% of the population, followed by Black Africans (32%) and Whites (6.9%). The main first language spoken in the ELM was Afrikaans (69.6%), followed by IsiXhosa (26.5%) and English (0.9%).

The population of Ward 6 in 2011 was 5 784. Of this total, 36.3% were under the age of 18, 58% were between 18 and 64, and the remaining 5.7% were 65 and older. Like the ELM, Ward 6 also had a relatively large young population. In terms of race groups, Coloureds made up 46.4% of the population, followed by Black Africans (45.2%) and Whites (7.3%). The main first language spoken in the Ward 6 was Afrikaans (56.2%), followed by IsiXhosa (32.3%) and English (2.1%).

The high percentage of young people in both the ELM and Ward 6 means that a large percentage of the population is dependent on a smaller productive sector. The dependency ratio for the ELM (2011) was

60.4%. The higher dependency ratio reflects the limited employment opportunities in the area and represent a significant risk to the district and local municipality. The high dependency ratio also highlights the importance to maximising local employment opportunities and the key role played by training and skills development programmes.

### **Employment**

The official unemployment figure in 2011 for the ELM was 14.5%. The figures also indicate that most of the population are not economically active, namely 43.7%. These figures are like the official unemployment rate for the Northern Cape Province (14.5%) and Pixley ka Seme District (14.8%). This reflects the limited employment opportunities in the area, which in turn are reflected in the low income and high poverty levels. Given the impact of the COVID-19 pandemic, the unemployment levels are likely to be higher in 2022. The figures for Ward 6 were 11.7% (unemployed) and 44% of the economically active population being employed.

### **Education**

In terms of education levels, the percentage of the population over 20 years of age in the ELM with no schooling was 17.4% in 2011, compared to 7.9% for the Northern Cape Province and 11.9% for the district. The percentage of the population over the age of 20 with matric was 28.3%, compared to 29.1% for the province and 25.3% for the district. Only 1.5% and 1.4% of the population over the age of 20 years in the ELM had an undergraduate and postgraduate qualification, respectively. The relatively poor education levels in the ELM pose a potential challenge to the implementation of an effective training and skills development programme for local community members. The figures for Ward 6 (2011) were 16.4% with no schooling, 18.6% with matric and 1.9% and 1.3% with an undergraduate and postgraduate degree respectively.

#### **6.7.2. Profile of the Immediate Affected Area**

The Carolus EGI is located approximately 10 km to the west of De Aar. The southern boundary of the site borders onto the railway line to Noupoot to the south west which then links up with Port Elizabeth to the south. The N10 which links De Aar to Port Elizabeth is located ~ 3km to the south of the site. The large, Eskom Hydra substation is located immediately to the west of the site. Other towns in the area are Philipstown, 35km to the north east, Britstown, 58km to the west and Hanover, 47km to the south of the site.

De Aar, which means "the artery", was founded in 1904, and is the second most important railway junction in the country. Rail lines linking Gauteng, Cape Town, Port Elizabeth and Namibia all pass through the town. The decline of the railway sector over the last 20 years has impacted negatively on the towns economy. De Aar also has the largest abattoir in the Southern Hemisphere and supplies all the major centres throughout the entire country with the famous "Karoo" lamb and mutton. Apart from meat production, the sheep farms around De Aar are also major suppliers of wool. The town is total dependant on boreholes for its water supply. 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, specifically sheep farming.

The N10 national road traverses the study area from the N1 national road (near Hanover) to De Aar. The areas sense of place is also impacted by rail infrastructure, with De Aar representing the second most

important railway junction in South Africa. Railway lines run from the north, west, south and the south east, converging in the town. These lines include both freight and passenger lines.

Other industrial infrastructure within the study area includes the Hydra (to the west of the proposed Carolus EGI properties) and Bletterman Substations. The Hydra Substation Road provides access to the Carolus EGI properties from the N10 national road. There are a large number of overhead transmission lines associated the substations. These include:

- Hydra/Perseus 2 and 3 400kV.
- Beta/Hydra 1 400kV.
- Hydra/Ndhlovu 1 132kV.
- Hydra/Roodekuil 1 132kV.
- Hydra/Roodekuil 2 220kV.
- Hydra/Ruigtevallei 1 and 2 220kV.
- Bletterman/Taaibos 1 132kV.
- Hydra/Poseidon 1 and 2 400kV.



## CHAPTER 7: ASSESSMENT OF POTENTIAL IMPACTS

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This chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) expected to be associated with the Carolus 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 ~100mx100m in extent. The power line corridor is 300 m wide and between 4.3 km and 7.8 km long, depending on the MTS it connects to. The proposed 132kV power line will be appropriately placed within the power line corridor and will have a servitude of 31 m. During construction, a permanent access road along the length of the power line corridor between 6 - 8m wide will be established to allow for movement of construction vehicles and equipment. This road will be retained for use during operation for maintenance of the power line. Additional infrastructure associated with the Carolus EGI will include buildings, and temporary and permanent laydown areas.

The full extent of the 200 m 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**.

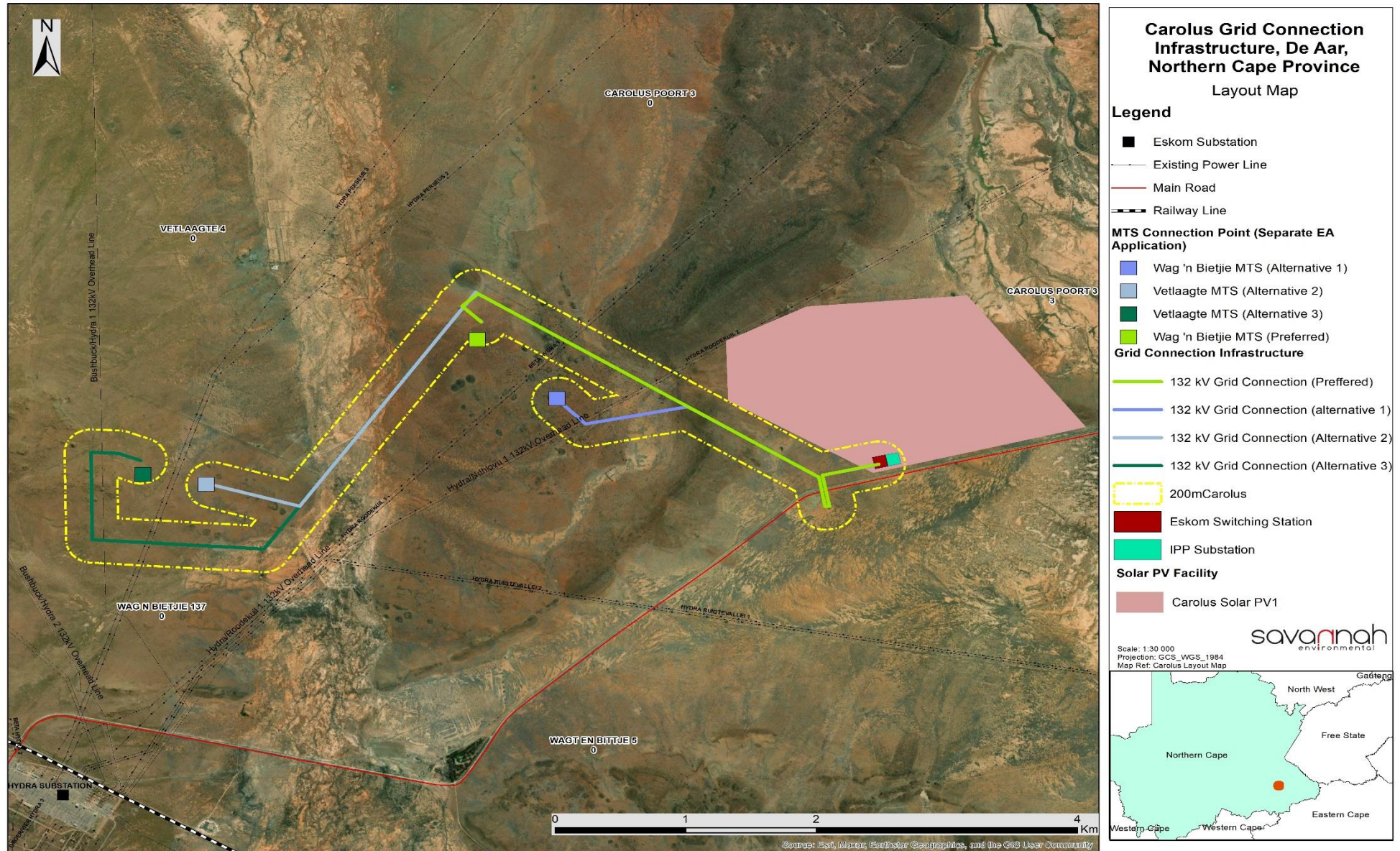


Figure 7.1: Map showing layout assessed as part of this BA process.

The development of the Carolus Grid Connection Infrastructure 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 Carolus Grid Connection Infrastructure is estimated to be up to 12 - 18 months.
- » **Operation** – will include the operation of the grid connection infrastructure (i.e., the two 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(1)(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 Carolus 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 <b>sections 7.3. to 7.9.</b>
3(1)(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 Carolus EGI are included in <b>sections 7.3. to 7.9.</b>
3(1)(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 Carolus EGI are included in <b>sections 7.3. to 7.9.</b>
3(1)(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	A description of all environmental impacts identified for the Carolus 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 <b>sections 7.3. to 7.9.</b>

Requirement	Relevant Section
could be avoided or addressed by the adoption of mitigation measures.	
3(1)(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 Carolus 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 <b>sections 7.3. to 7.9.</b> The cumulative impacts associated with the development of the Carolus EGI are included and assessed in <b>section 7.10.</b>
3(1)(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 <b>sections 7.3. to 7.9.</b>

## 7.2 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).

### 7.2.1. Results of the Ecology Impact Assessment

The study area consists mostly of natural habitat that is used for grazing and livestock agriculture. 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 Carolus EGI site is situated in the Grassland and Nama Karoo biomes. The fine scale vegetation types that occur on site, i.e., Northern Upper Karoo, and the Besemkaree Koppies Shrubland, are both widespread and have low rates of transformation across their geographical range. The Plants of South Africa database indicates that 116 species of indigenous plants are expected to occur within the project area and surrounding landscape. None of the species expected are species of conservation concern.

To determine sensitivity on site, local and regional factors were taken into account. The habitat physiognomy within the larger project area is diverse and, based on the fauna components recorded within this area and proximal landscape, the area provides important ecosystem services, particularly with regards to the maintenance of dynamic soil properties and pollination services. The site ecological importance of the larger project area was determined to vary from 'Very Low' to 'Very High' based on the high likelihood of occurrence for near threatened species, the extent of the area considered and its connectivity to natural areas within the landscape, and the low resilience of the vegetation type.

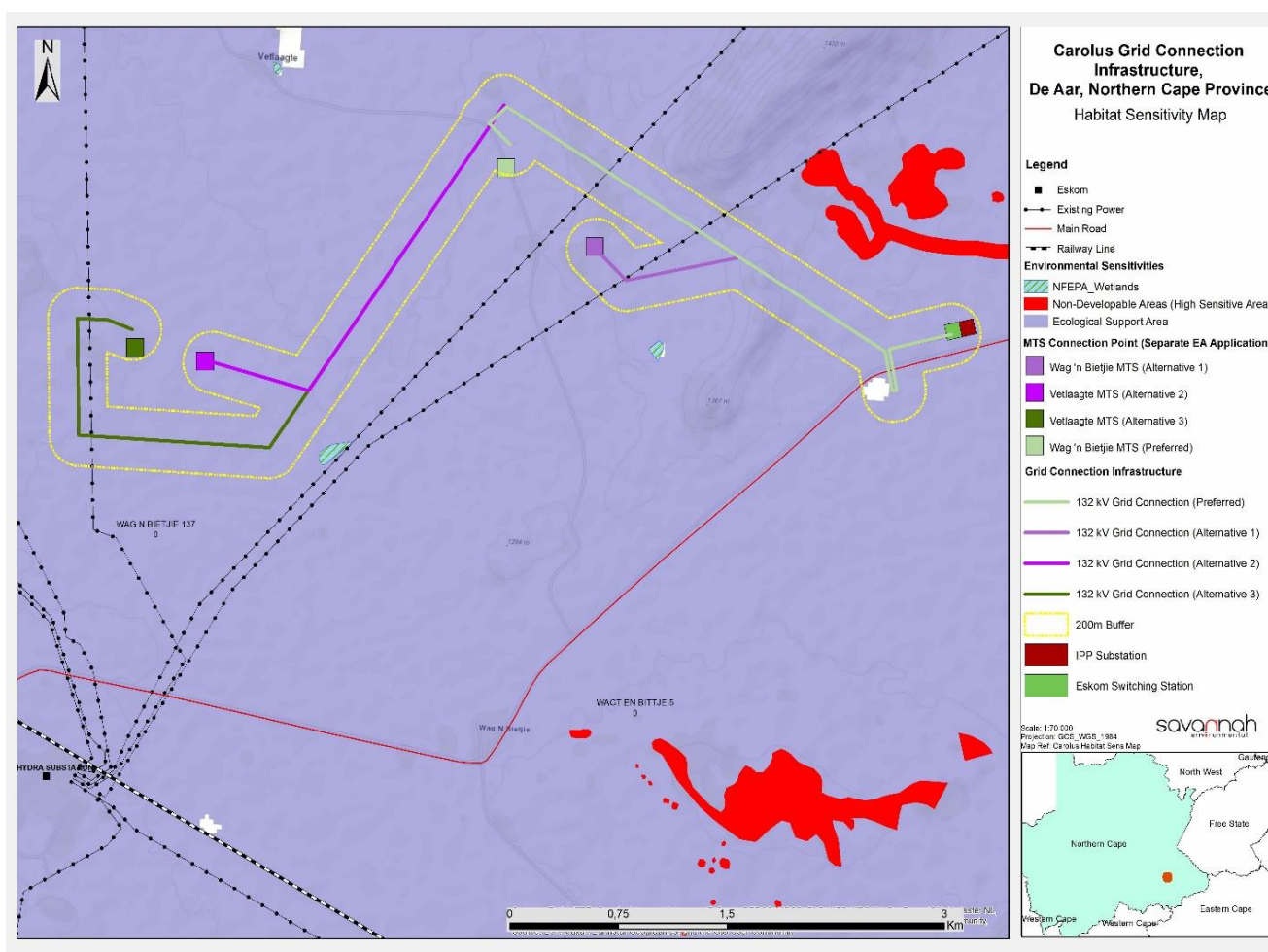
At a regional level, the EGI predominantly overlaps with an Ecological Support Area. ESAs are areas that must be maintained in at least fair ecological condition (semi-natural/moderately modified state) in order to support the ecological functioning of a CBA or protected area, or to generate or deliver ecosystem services, or to meet remaining biodiversity targets for ecosystem types or species when it is not possible or

no necessary to meet them in natural or near-natural areas (SANBI, 2016). The nature of the development, i.e., an EGI, may lead to the destruction of a portion of the ESA and consequently, the footprint area will be no longer congruent with an ESA until such a time that the project area is rehabilitated post decommissioning.

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

Loss of habitat and fauna emigration is a High to Very High Sensitivity. According to the Northern Cape Critical Biodiversity Areas spatial database, the Carolus EGI site is recognized as an Ecological Support Area. The Environmental Screening Tool rated the Combined Terrestrial Biodiversity Theme Sensitivity as 'Very High.' According to the NFEPA database, the Ecosystem Protection Level for the vegetation type associated with the development footprint is Not Protected, and it is classified as an Upstream Management Area.

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

### 7.2.2. Description of Impacts on Ecology

Potential impacts associated with the construction, operation and decommissioning phases of the proposed grid connection infrastructure on ecology include the following:

Construction Phase:

- Loss of habitat within development footprint
- Habitat degradation and/or destruction due to encroachment of Invasive Alien Plants, poor solid waste management and erosion
- Direct mortality of fauna

Operation Phase:

- Encroachment of Invasive Alien Plants into disturbed areas
- Direct mortality of fauna

Decommissioning Phase:

- Direct mortality of fauna
- Continued habitat degradation is rehabilitation management plans are not implemented

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

**Construction Phase Impacts**

<b>Impact Nature: Loss of habitat within development footprint</b>		
There will be a loss of natural vegetation and habitat due to placement of pylons and construction of the access road.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Low (2)	Very Low (1)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Very high (10)	Moderate (6)
<b>Probability</b>	Definite (5)	Definite (5)
<b>Significance</b>	<b>High (80)</b>	<b>Medium (55)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>» Demarcate work areas during the construction phase to avoid affecting outside development footprint areas. Use physical barriers e.g., safety tape and signage.</li> <li>» No infrastructure to be located within water resource buffer zones.</li> <li>» Do not clear areas of indigenous vegetation outside of the direct project footprint.</li> <li>» Minimise vegetation clearing to the minimum required.</li> <li>» Existing roads/servitudes should be considered first option over the construction of new roads/servitudes and must only be made where necessary.</li> <li>» Compile and implement a Rehabilitation Plan from the onset of the project.</li> <li>» Rehabilitate areas as soon as they are no longer impacted by construction.</li> <li>» The rehabilitated areas must be revegetated with indigenous vegetation.</li> <li>» Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover.</li> </ul>		
<b>Residual Impacts:</b>		
The loss of indigenous vegetation is an unavoidable consequence of the development and cannot be entirely mitigated. The residual impact would be low.		

<b>Impact Nature: Habitat degradation and/or destruction due to encroachment of Invasive Alien Plants, poor solid waste management and erosion</b>		
Habitat degradation and/or destruction is likely to occur due to invasive plant encroachment and erosion because of disturbance from vegetation clearing and earthworks. Improper solid waste management from construction activity will also lead to habitat degradation and/or destruction.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Moderate (3)	Low (2)
<b>Duration</b>	Permanent (5)	Very short term (1)
<b>Magnitude</b>	Very High (10)	Minor (2)
<b>Probability</b>	Highly probable (4)	Improbable (2)
<b>Significance</b>	<b>High (72)</b>	<b>Low (10)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Low	High
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>» Compile and implement a Rehabilitation Plan.</li> <li>» Compile and implement an Invasive Alien Plant Management Programme. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must also prescribe a monitoring plan and be updated as/when new data is collated.</li> <li>» Compile and implement a Solid Waste Management Plan. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis as a minimum.</li> </ul>		
<b>Residual Impacts:</b>		
There is still potential for erosion and invasive plant encroachment but is likely to be limited.		

<b>Impact Nature: Direct mortality of fauna</b>		
Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions and persecution.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Moderate (3)	Low (2)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Moderate (6)	Minor (2)
<b>Probability</b>	Highly probable (4)	Improbable (2)
<b>Significance</b>	<b>Medium (44)</b>	<b>Low (12)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes, vehicle collisions, poaching, and persecution can be mitigated.	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>» All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species.</li> <li>» Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate.</li> <li>» Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist.</li> <li>» All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.</li> <li>» All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.</li> </ul>		

» Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter.

**Residual Impacts:**

It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

**Operation Phase Impacts**

**Impact Nature: Encroachment of Invasive Alien Plants into disturbed areas**

Invasive Alien Plants (IAPs) tend to encroach into disturbed areas and can outcompete/displace indigenous vegetation.

	Without mitigation	With mitigation
<b>Extent</b>	Moderate (3)	Moderate (3)
<b>Duration</b>	Permanent (5)	Very short term (1)
<b>Magnitude</b>	High (8)	Minor (2)
<b>Probability</b>	Highly probable (4)	Improbable (2)
<b>Significance</b>	<b>High (64)</b>	<b>Low (12)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	

**Mitigation:**

- » An IAP Management Plan must be written and implemented for the development. The developer must contract a specialist to develop the plan and the developer is responsible for its implementation.
- » Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project.
- » All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan.

**Residual Impacts:**

With the implementation of an IAP Management Plan there are unlikely to be residual impacts

**Impact Nature: Direct mortality of fauna**

Maintenance of infrastructure during the operational phase will likely lead to direct mortality of fauna due to earthworks, vehicle collisions and persecution.

	Without mitigation	With mitigation
<b>Extent</b>	Moderate (3)	Low (2)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Moderate (6)	Minor (2)
<b>Probability</b>	Highly probable (4)	Improbable (2)
<b>Significance</b>	<b>Medium (44)</b>	<b>Low (12)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes, vehicle collisions, poaching, and persecution can be mitigated.	

**Mitigation:**

- » All personnel and contractors must undergo Environmental Awareness Training and must include awareness about not harming or collecting species.
- » All vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.



» Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter.

**Residual Impacts:**

It is probable that some individuals of susceptible species will be lost to maintenance-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

**Decommissioning Phase Impacts**

**Impact Nature: Direct mortality of fauna**

Decommissioning activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions and persecution.

	Without mitigation	With mitigation
<b>Extent</b>	Moderate (3)	Low (2)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Moderate (6)	Minor (2)
<b>Probability</b>	Highly probable (4)	Improbable (2)
<b>Significance</b>	<b>Medium (44)</b>	<b>Low (12)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes, vehicle collisions, poaching, and persecution can be mitigated.	

**Mitigation:**

- » All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species.
- » Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate.
- » Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist.
- » All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
- » All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.
- » Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter.

**Residual Impacts:**

It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

**Impact Nature: Continued habitat degradation**

Disturbance created during decommissioning will leave the development area vulnerable to erosion and alien plant invasion for several years.

	Without Mitigation	With Mitigation
<b>Extent</b>	Moderate (3)	Local (1)
<b>Duration</b>	Permanent (5)	Long-term (3)
<b>Magnitude</b>	Very High (5)	Minor (2)
<b>Probability</b>	Highly Probable (4)	Improbable (2)
<b>Significance</b>	<b>High (52)</b>	<b>Low (12)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Low	High
<b>Irreplaceable loss of resources</b>	Yes	No

<b>Can impacts be mitigated?</b>	Yes, with proper management and avoidance, this impact can be mitigated to a low level.
<b>Mitigation:</b>	
<ul style="list-style-type: none"> <li>» Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase.</li> <li>» Monitoring of the rehabilitated area must be undertaken at quarterly intervals for 3 years after the decommissioning phase.</li> <li>» All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.</li> <li>» There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.</li> <li>» Implementation of a Solid Waste Management Plan.</li> </ul>	
<b>Residual Impacts:</b>	
No significant residual risks are expected, although IAP encroachment and erosion might still occur but would have a negligible impact if effectively managed.	

#### 7.2.4. Overall Result

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

- » Natural vegetation and habitat will be lost as a result of the placement of pylons and the construction of the access road. The loss of indigenous vegetation is an unavoidable consequence of development that cannot be mitigated entirely.
- » Invasive plant encroachment and erosion caused by disturbance from vegetation clearing and earthworks are likely to cause habitat degradation and/or destruction.
- » Improper construction waste management will also contribute to habitat degradation and/or destruction.
- » Construction activities may lead to loss of fauna due to earthworks, vehicle collisions and persecution. It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.
- » Invasive Alien Plants (IAPs) tend to encroach into disturbed areas and can outcompete/displace indigenous vegetation. With the implementation of an IAP Management Plan there are unlikely to be residual impacts.
- » Maintenance of infrastructure during the operational phase may lead to the loss of fauna due to earthworks, vehicle collisions and persecution. It is probable that some individuals of susceptible species will be lost to maintenance-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

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 a low significance after mitigation. Based on the ecology impact assessment, the opinion of the specialist is that the project should be able to proceed on condition that the recommended mitigation measures are put in place to minimise predicted impacts.

### 7.3 Assessment of Impacts on Aquatic Ecology

The development of the Carolus EGI is likely to result in a variety of impacts from an aquatic ecology perspective. The National Web based Environmental Screening Tool indicates a "very high" rating for the aquatic theme sensitivity. Therefore, an impact assessment has been conducted by the specialist in accordance with the requirements of the specialist protocols. Potential Impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details).

#### 7.3.1. Results of the Aquatic Impact Assessment

Based on a combination of desktop and in-field study several aquatic impacts have been identified in the proposed development area. The 132 kV power line extends from the Carolus Solar PV1 area (of which the Carolus EGI forms part of) in the Brak Sub-quadernary catchment (SQR) D62D-5391, across a watershed and into the catchment of a tributary of the Brak River (Brak tributary SQR D62D-5332). The power line infrastructure traverses an unnamed ephemeral/secondary non-perennial watercourse network (Western Tributary) draining in a south-westerly direction into the Brak tributary.

The land use surrounding the project area predominantly includes farming activities between natural land and land situated between the watercourses. Land use within a catchment influences the ecological integrity of the associated watercourses. Due to the limited land and water use modification within the project related catchment areas, the SQRs were considered largely natural to moderately modified at a desktop level (DWS, 2014). Ephemeral watercourses of the arid regions such as the Karoo are typically dependent on groundwater discharge and are particularly vulnerable to changes in hydrology and are known to be slow to recover from any impacts. Impacts from the alteration of land use within a catchment which includes contaminated runoff from the construction phase of solar developments and associated infrastructure such as the EGI can contribute to the elevated levels in the downslope watercourses (the receptor).

Based on Google Earth imagery and the listed NFEPA biodiversity features, the project area presented channelled valley bottom wetland characteristics, which is typical for the gentle sloped reaches of many river systems. Typically, wetlands offer a host of ecosystems services which includes purification of water quality through phytoremediation by the wetland vegetation. The wetlands are expected to provide cleansing effects from surface runoff associated with the proposed solar development and must be maintained and protected from degradation notably erosion and sedimentation during the proposed project activities.

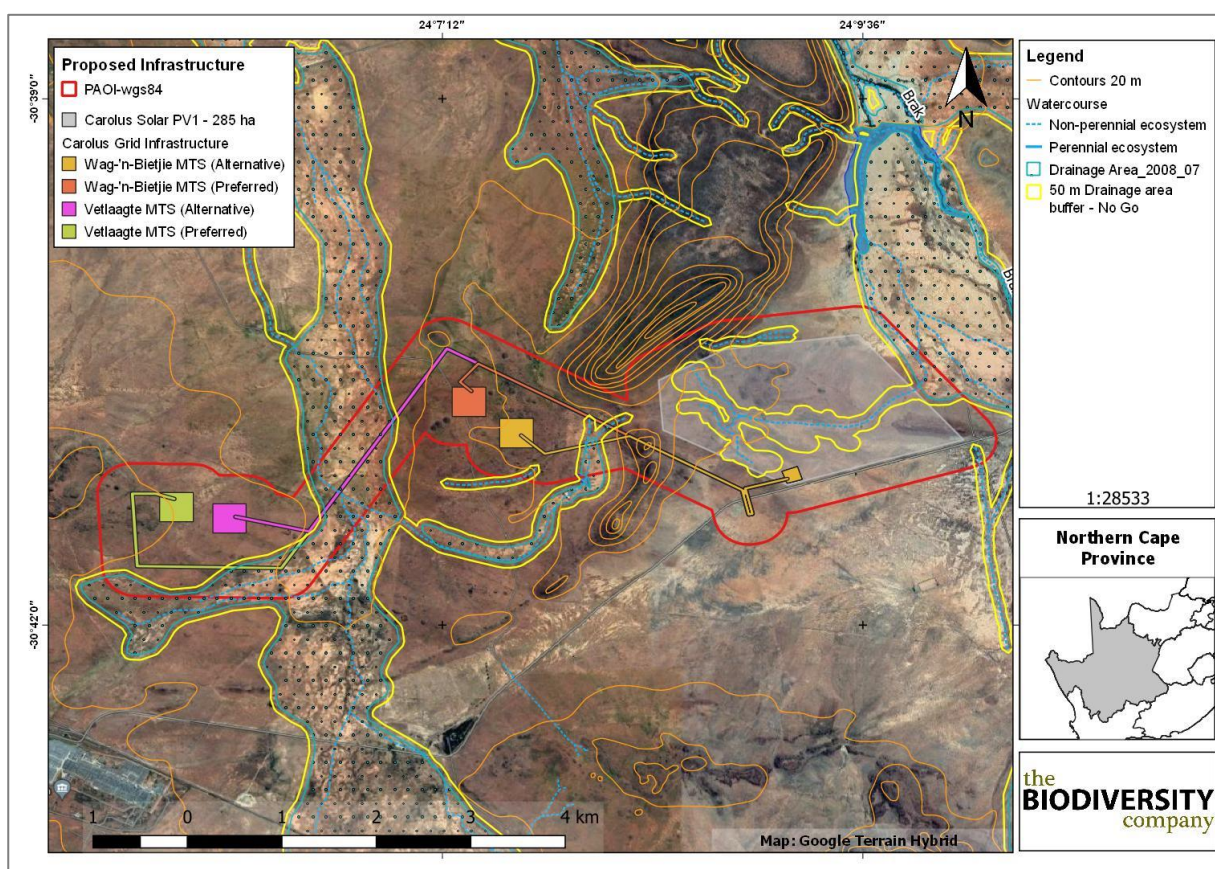
The wetland units were largely indirectly associated with the project (outside of the 500 m regulated area) warranting no further ecological assessment of the wetland systems for this project, with emphasis rather afforded to the aquatic assessment of the rivers possibly at risk from the proposed project infrastructure.

The proposed development overlaps with an Ecological Support Area. The nature of the development will lead to localised destruction of the ESA and consequently, the footprint area will no longer be congruent with an ESA. The freshwater ecology of the immediate project area and further downstream is sensitive to disturbance from a hydrological and biological perspective, however due to the ephemeral nature of the watercourses, this sensitivity applies more to the watercourses physical characteristics that influence the hydrological and biological aspects in times of surface water presence.

The project area activities should be aligned with the Resource Water Quality Objectives (RWQOs) for the Orange WMA in order to limit impacts to local watercourses and their ecological drivers (water quality, flow dynamics and habitat) while maintaining biodiversity goals for the directly associated Brak River catchment and those watercourses downstream of the project area. The stipulated RWQOs should be considered for the Environmental Management Plan (EMP) and monitoring protocols should environmental authorisation be granted for this project.

### 7.3.2. Description of Impacts on Aquatic Ecology

The infrastructure of concern to the aquatic features and their associated 50 m buffer is limited to the Western Tributary network whereby the drainage network will be traversed by the proposed power line infrastructure in several areas (refer to **figure 7.3**). The orientation of the power line corridor is in such a manner that the route extends diagonally across (45 degrees) the main stem reach (drainage/flow direction) of the Western Tributary and not perpendicularly (90 degrees) to the drainage/flow direction. This diagonal orientation would result in a greater number of power line pylons located directly within the sensitive watercourse features and buffer area than if the route were redesigned perpendicular to the drainage channel. This perpendicular orientation would result in far less pylons within the drainage area. Additional avoidance measures include limiting pylons from being built within or near drainage features by having the power line span watercourse features, notably the smaller systems. Additionally, the associated road network should follow avoidance mitigation and be aligned to avoid all drainage features, and where crossings are absolutely necessary, the road should be constructed of permeable materials in key areas of wetness or steep slopes to prevent erosion or habitat destruction during use.



**Figure 7.3:** Map illustrating the developable and non-developable areas within the proposed development area

### Construction phase:

The following potential main impacts on the ephemeral watercourses and associated biodiversity dependent on these systems (based on the framework above) were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed infrastructure is constructed; and is considered to have direct impacts on aquatic ecosystems, notably where infrastructure intercepts the watercourses. This phase typically involves the removal of indigenous vegetation for infrastructure (laydown yards, power lines, substation, and the associated road network & river crossing structures), landscaping to desired topography, and the establishment of infrastructure. This involves earthworks activities (digging, soil moving and soil stockpiling) and the use of construction chemicals and materials and machinery all of which influence adjacent habitats and includes watercourses. The following construction phase related impacts to aquatic ecology were considered:

- Disturbance/ displacement/ loss of riparian/marginal and instream riverine habitat (Habitat fragmentation).
- Contamination of watercourse and biotic community effects.
- Alteration of catchment hydrology and associated habitat ecology impacts.

### Operational phase:

The operational phase impacts are related to daily operational and maintenance activities which are anticipated to have indirect impacts on aquatic ecosystems, as well as the deterioration of the adjacent habitats due to the increase in maintenance vehicles across the project footprint. The modification of the catchment drainage will alter watercourse habitats through altered drainage from baseline conditions with increased erosion and sedimentation, especially in exposed/ denuded areas and increased hardened surfaces (solar panels and roads). Stormwater management will therefore be crucial within the proposed operations footprint. This phase typically involves the maintenance of the power line, and the operation of the road network and river crossing structures for the power line inspections. The following operational phase related impacts to aquatic ecology were considered:

- Continued fragmentation and degradation of habitats and ecosystems.
- Contamination of watercourse and biotic community effects.

### Decommissioning phase:

Solar projects and associated EGI typically operate for approximately twenty to thirty years. Following the completion of the economic life of the project or approaching permit expiration, the project owner can apply for a new permit or remove/decommission the facility. The renewal of permits option could involve either operating the same solar panels as the panels can operate past thirty years, albeit at lower efficiency, or "repower" the site by upgrading the facility with more efficient solar technology. Otherwise, the facility can be decommissioned. The solar project permits may define how a solar project is to be decommissioned.

Decommissioning refers to removal of equipment and restoration of the site to near baseline conditions or alternatively the site can be repurposed for other uses, such as agricultural production. Often the solar panels are recycled (glass and aluminium) or sold for off-grid applications or electrification in developing countries. The associated infrastructure (solar and grid, roads and fencing) and foundations are dismantled, and various parts are refurbished, recycled, or landfilled as appropriate. The restoration of the land would involve

backfilling of excavations, de-compacting of compacted soils, landscaping to natural conditions, and revegetation of the entire project disturbance footprint.

The impacts for the decommission phase are considered to be similar in significance to the construction phase as the activities are similar and are carried out in reverse order. The impact ratings for this phase would therefore be similar.

- Disturbance/ displacement/ loss of riparian/marginal and instream riverine habitat (Habitat fragmentation).
- Contamination of watercourse and biotic community effects.
- Alteration of catchment hydrology and associated habitat ecology impacts.

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

The proposed power line and collector substation construction is regarded as a low risk to the watercourses within the study area should construction occur outside of the delineated sensitive areas as the footprint area is limited to the pylon base. However, the expected increase in traffic along the associated road servitude is likely to increase erosion of watercourse channels and banks along drainage lines and watercourse areas. Should pylon placement be within the watercourse areas, impacts would be expected. The grid connection infrastructure poses a low risk to the watercourse network during the operational phase should the pylons be constructed outside of the delineated drainage network by spanning overhead of these areas.

#### Construction Phase Impacts

<b>Impact Nature: Disturbance/ displacement/ loss of riparian, marginal and instream riverine habitat (Habitat fragmentation)</b>		
Destruction, loss and fragmentation of the of habitats, ecosystems and biotic community responses to the alteration of the catchment for solar, grid and associated infrastructure.		
	<b>Without mitigation (Impact Rating)</b>	<b>With mitigation (Impact Rating)</b>
<b>Extent</b>	Footprint & surrounding areas (2)	Site specific (1)
<b>Duration</b>	Permanent (5)	The lifetime of the impact will be of a short duration (2-5 years) (2)
<b>Magnitude</b>	Moderate and will result in processes continuing but in a modified way (6)	Low and will cause a slight impact on processes (4)
<b>Probability</b>	Definite (5)	Probable (3)
<b>Significance</b>	<b>High (65)</b>	<b>Low (21)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	Yes - ESA	No
<b>Can impacts be mitigated?</b>	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable. However, the construction footprint can be realigned to avoid/minimise disturbance to drainage features and associated buffers	
<b>Mitigation:</b>		
The following powerline and road mitigation measures are provided:		
<ul style="list-style-type: none"> <li>• The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.</li> </ul>		

- The pylons must be constructed outside of the delineated drainage network by spanning overhead of these sensitive areas. This avoidance measure limits pylons from being built within or near drainage features, notably the active channel.
- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be completely avoided.
- Install sedimentation/erosion protection measures prior to construction in the form of several rows of sandbags, silt traps and fences, this is particularly important in the access roads leading to the watercourse and around active working areas for pylons foundations.
- Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.
- The road margins should be hydroseeded with vigorous growing indigenous grasses that are drought tolerant to lower erosion of these key areas.
- An inspection of the pylons, road network and surrounding influenced areas must be completed within 1 month following the end of construction activities and within a week after the first rainfall event. Thereafter, routine monitoring should take place for the life of the project. Should erosion be developing this must be immediately addressed through appropriate and adaptive measures.

**Residual Impacts:**

The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact following mitigation would however be low for the construction phase with focus on limiting erosion required.

**Impact Nature: Pollution of water resources from construction activities**

Pollution stemming from construction activities (spills and leaks from machinery and construction materials, leaching from excavated soils and waste handling) that enters the natural environment and downslope watercourses, with associated impacts to soils, habitat integrity and ecological function which in turn lowers the aquatic and terrestrial biodiversity dependent on the affected ecosystems, notably in times of surface water availability.

	<b>Without mitigation (Impact Rating)</b>	<b>With mitigation (Impact Rating)</b>
<b>Extent</b>	Local area (3)	Site specific (1)
<b>Duration</b>	Moderate term (5–15 years) (3)	Very short term (0–1 years) (1)
<b>Magnitude</b>	Moderate and will result in processes continuing but in a modified way (6)	Minor and will not result in an impact on processes (2)
<b>Probability</b>	Definite (5)	Probable (3)
<b>Significance</b>	<b>Medium (60)</b>	<b>Low (12)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes, although this impact cannot be well mitigated as some level of pollution is unavoidable, notably where powerline pylons and roads are to be built within drainage areas.	

**Mitigation:**

The following powerline and road mitigation measures are provided:

- The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.
- The pylons must be constructed outside of the delineated drainage network by spanning overhead of these sensitive areas. This avoidance measure limits pylons from being built within or near drainage features, notably the active channel.
- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be completely avoided.
- Install sedimentation/erosion protection measures prior to construction in the form of several rows of sandbags, silt traps and fences, this is particularly important in the access roads leading to the watercourse and around active working areas for pylons foundations.
- Rehabilitate all cleared areas as soon as possible to limit erosion potential.

- The road margins should be hydroseeded with vigorous growing indigenous grasses that are drought tolerant to lower erosion of these key areas.
- An inspection of the pylons, road network and surrounding influenced areas must be completed within 1 month following the end of construction activities and within a week after the first rainfall event. Thereafter, routine monitoring should take place for the life of the project. Should erosion be developing this must be immediately addressed through appropriate and adaptive measures.

**Residual Impacts:**

Some level of pollution is inevitable due to the nature of the construction activities and cannot be entirely mitigated. The residual impact following mitigation would however be low and of short duration for the construction phase.

**Impact Nature: Alteration of catchment hydrology and associated habitat ecology impacts from construction activities**

Construction phase activities that result in the reshaping and change in vegetative cover density for solar infrastructure with associated alterations of slope, runoff velocities, infiltration capacity and sediment movement from baseline conditions. This is expected to occur across the catchment, with associated impacts to slope stability, habitat integrity and ecological function. This is especially of concern due to the high erodibility of catchment soils in this arid environment and keys areas would include active working areas (road network, PV area, grid infrastructure, etc) where bare soils are exposed to washaway.

	<b>Without mitigation (Impact Rating)</b>	<b>With mitigation (Impact Rating)</b>
<b>Extent</b>	Local area (3)	Footprint & surrounding areas (2)
<b>Duration</b>	Permanent (5)	The lifetime of the impact will be of a short duration (2-5 years) (2)
<b>Magnitude</b>	High (processes are altered to the extent that they temporarily cease) (8)	Low and will cause a slight impact on processes (4)
<b>Probability</b>	Definite (5)	Probable (3)
<b>Significance</b>	<b>High (80)</b>	<b>Low (24)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	None	Moderate
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes, although this impact cannot be well mitigated as the hydrology alterations are unavoidable and long term. However, the construction footprint can be realigned to avoid watercourses and associated buffers	

**Mitigation:**

The following powerline and road mitigation measures are provided:

- The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.
- The pylons must be constructed outside of the delineated drainage network by spanning overhead of these sensitive areas. This avoidance measure limits pylons from being built within or near drainage features, notably the active channel.
- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be completely avoided.
- Install sedimentation/erosion protection measures prior to construction in the form of several rows of sandbags, silt traps and fences, this is particularly important in the access roads leading to the watercourse and around active working areas for pylons foundations.
- Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.
- The road margins should be hydroseeded with vigorous growing indigenous grasses that are drought tolerant to lower erosion of these key areas.



- An inspection of the pylons, road network and surrounding influenced areas must be completed within 1 month following the end of construction activities and within a week after the first rainfall event. Thereafter, routine monitoring should take place for the life of the project. Should erosion be developing this must be immediately addressed through appropriate and adaptive measures.

**Residual Impacts:**

Alteration of the catchment hydrology is inevitable due to the nature of the construction activities and cannot be entirely mitigated. The residual impact following mitigation would however be low and of short duration for the construction phase.

**Operational phase impacts**

<b>Impact Nature: Continued disturbance/ displacement/ loss of riparian, marginal and instream riverine habitat</b>		
Disturbance created during the construction phase will leave the project area and watercourses vulnerable to erosion (highly erodible catchment) and encroachment by alien vegetation. The operational phase activities will result in the continued destruction, loss and fragmentation of habitats, ecosystems and biotic community responses.		
	<b>Without mitigation (Impact Rating)</b>	<b>With mitigation (Impact Rating)</b>
<b>Extent</b>	Footprint & surrounding areas (2)	Site specific (1)
<b>Duration</b>	Long term (> 15 years) (4)	The lifetime of the impact will be of a short duration (2-5 years) (2)
<b>Magnitude</b>	Moderate and will result in processes continuing but in a modified way (6)	Low and will cause a slight impact on processes (4)
<b>Probability</b>	Definite (5)	Probable (3)
<b>Significance</b>	<b>Medium (60)</b>	<b>Low (21)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
<b>Mitigation:</b>		
The following powerline and road mitigation measures are provided:		
<ul style="list-style-type: none"> <li>The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.</li> <li>The pylons must be constructed outside of the delineated drainage network by spanning overhead of these sensitive areas. This avoidance measure limits pylons from being built within or near drainage features, notably the active channel.</li> <li>Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be completely avoided.</li> <li>Install sedimentation/erosion protection measures prior to construction in the form of several rows of sandbags, silt traps and fences, this is particularly important in the access roads leading to the watercourse and around active working areas for pylons foundations.</li> <li>Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.</li> <li>Energy dissipation, such as stone berms or blocks must be strategically placed along the road margins for the entire road network as surface runoff leaves the roads and enters the surrounding environment with the potential for severe erosion. The steeper the slope of the road, the more regular the berms should be spaced and can be as close as one meter apart where necessary.</li> <li>The road margins should be hydroseeded with vigorous growing indigenous grasses that are drought tolerant to lower erosion of these key areas.</li> <li>The section of roads which will traverse the lowest lying areas/potentially wet areas or steeper slopes will be subjected to traffic from vehicles for inspections and maintenance on site with the potential for damage to habitat and erosion and thus require permeable paving. The permeable paving provides a stable platform to carry the loads of service vehicles, increases infiltration and lowers surface runoff, whilst the vegetation growing</li> </ul>		

<p>through the permeable pavers compliments the surrounding vegetation, cumulatively preventing erosion in these key areas.</p> <ul style="list-style-type: none"> <li>An inspection of the pylons, road network and surrounding influenced areas must be completed within 1 month following the end of construction activities and within a week after the first rainfall event. Thereafter, routine monitoring should take place for the life of the project. Should erosion be developing this must be immediately addressed through appropriate and adaptive measures.</li> </ul>
<p><b>Residual Impacts:</b></p> <p>The ESA areas will be lost or degraded by the grid development activities. Despite mitigation, erosion is expected across the project footprint, influencing downslope watercourses and habitat, especially where roads and power line pylons intercept with watercourses. The residual impact following mitigation would however be low.</p>

<p><b>Impact Nature: Pollution of water resources from operational activities</b></p> <p>The operation and maintenance of the proposed development will involve possible pollution impacts can be expected from hydrocarbons (fuels, oil, etc) from leaking maintenance vehicles which escape into the environment along the road network, entering downslope watercourses during rainfall events, with similar impacts to water quality and ecological functioning.</p>		
	<b>Without mitigation (Impact Rating)</b>	<b>With mitigation (Impact Rating)</b>
<b>Extent</b>	Regional (4)	Footprint & surrounding areas (2)
<b>Duration</b>	Long term (> 15 years) (4)	The lifetime of the impact will be of a short duration (2-5 years) (2)
<b>Magnitude</b>	Moderate and will result in processes continuing but in a modified way (6)	Low and will cause a slight impact on processes (4)
<b>Probability</b>	Definite (5)	Probable (3)
<b>Significance</b>	<b>High (70)</b>	<b>Low (24)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Low	Moderate
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes, although this impact cannot be well mitigated as some level of pollution is unavoidable. Despite this spill kits and other spill prevention measures should be in place	
<p><b>Mitigation:</b></p> <p>The following powerline and road mitigation measures are provided:</p> <ul style="list-style-type: none"> <li>The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.</li> <li>The pylons must be constructed outside of the delineated drainage network by spanning overhead of these sensitive areas. This avoidance measure limits pylons from being built within or near drainage features, notably the active channel.</li> <li>The realignment of the powerlines within the Western Tributary to a perpendicular orientation would result in a lower number of powerline pylons located directly within the Western Tributary and buffer area.</li> <li>Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be completely avoided.</li> <li>Install sedimentation/erosion protection measures prior to construction in the form of several rows of sandbags, silt traps and fences, this is particularly important in the access roads leading to the watercourse and around active working areas for pylons foundations.</li> <li>Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.</li> <li>Energy dissipation, such as stone berms or blocks must be strategically placed along the road margins for the entire road network as surface runoff leaves the roads and enters the surrounding environment with the potential for severe erosion. The steeper the slope of the road, the more regular the berms should be spaced and can be as close as one meter apart where necessary.</li> <li>The road margins should be hydroseeded with vigorous growing indigenous grasses that are drought tolerant to lower erosion of these key areas.</li> </ul>		

- The section of roads which will traverse the lowest lying areas/potentially wet areas or steeper slopes will be subjected to traffic from vehicles for inspections and maintenance on site with the potential for damage to habitat and erosion and thus require permeable paving. The permeable paving provides a stable platform to carry the loads of service vehicles, increases infiltration and lowers surface runoff, whilst the vegetation growing through the permeable pavers compliments the surrounding vegetation, cumulatively preventing erosion in these key areas.
- An inspection of the pylons, road network and surrounding influenced areas must be completed within 1 month following the end of construction activities and within a week after the first rainfall event. Thereafter, routine monitoring should take place for the life of the project. Should erosion be developing this must be immediately addressed through appropriate and adaptive measures.

**Residual Impacts:**

Some level of pollution is inevitable due to the nature of the operational activities and cannot be entirely mitigated. The residual impact following mitigation would be Low and of short duration following the implementation of mitigation.

**Decommissioning phase impacts**

**Impact Nature: Disturbance/ displacement/ loss of riparian, marginal and instream riverine habitat (Habitat fragmentation)**

Destruction, loss and fragmentation of the of habitats, ecosystems and biotic community responses to the alteration of the catchment for solar, grid and associated infrastructure.

	<b>Without mitigation (Impact Rating)</b>	<b>With mitigation (Impact Rating)</b>
<b>Extent</b>	Footprint & surrounding areas (2)	Site specific (1)
<b>Duration</b>	Permanent (5)	The lifetime of the impact will be of a short duration (2-5 years) (2)
<b>Magnitude</b>	Moderate and will result in processes continuing but in a modified way (6)	Low and will cause a slight impact on processes (4)
<b>Probability</b>	Definite (5)	Probable (3)
<b>Significance</b>	<b>High (65)</b>	<b>Low (21)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	Yes - ESA	No
<b>Can impacts be mitigated?</b>	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable. However, the construction footprint can be realigned to avoid/minimise disturbance to drainage features and associated buffers	

**Mitigation:**

The following powerline and road mitigation measures are provided:

- The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.
- The pylons must be constructed outside of the delineated drainage network by spanning overhead of these sensitive areas. This avoidance measure limits pylons from being built within or near drainage features, notably the active channel.
- The realignment of the powerlines within the Western Tributary to a perpendicular orientation would result in a lower number of powerline pylons located directly within the Western Tributary and buffer area.
- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be completely avoided.
- Install sedimentation/erosion protection measures prior to construction in the form of several rows of sandbags, silt traps and fences, this is particularly important in the access roads leading to the watercourse and around active working areas for pylons foundations.
- Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.

- Energy dissipation, such as stone berms or blocks must be strategically placed along the road margins for the entire road network as surface runoff leaves the roads and enters the surrounding environment with the potential for severe erosion. The steeper the slope of the road, the more regular the berms should be spaced and can be as close as one meter apart where necessary.
- The road margins should be hydroseeded with vigorous growing indigenous grasses that are drought tolerant to lower erosion of these key areas.
- The section of roads which will traverse the lowest lying areas/potentially wet areas or steeper slopes will be subjected to traffic from vehicles for inspections and maintenance on site with the potential for damage to habitat and erosion and thus require permeable paving. The permeable paving provides a stable platform to carry the loads of service vehicles, increases infiltration and lowers surface runoff, whilst the vegetation growing through the permeable pavers compliments the surrounding vegetation, cumulatively preventing erosion in these key areas.
- An inspection of the pylons, road network and surrounding influenced areas must be completed within 1 month following the end of construction activities and within a week after the first rainfall event. Thereafter, routine monitoring should take place for the life of the project. Should erosion be developing this must be immediately addressed through appropriate and adaptive measures.

**Residual Impacts:**

The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact following mitigation would however be low for the construction phase with focus on limiting erosion required.

**Impact Nature: Pollution of water resources from decommissioning activities**

Pollution stemming from decommissioning activities (spills and leaks from machinery and materials, leaching from excavated soils and waste handling) that enters the natural environment and downslope watercourses, with associated impacts to soils, habitat integrity and ecological function which in turn lowers the aquatic and terrestrial biodiversity dependent on the affected ecosystems, notably in times of surface water availability.

	<b>Without mitigation (Impact Rating)</b>	<b>With mitigation (Impact Rating)</b>
<b>Extent</b>	Local area (3)	Site specific (1)
<b>Duration</b>	Moderate term (5–15 years) (3)	Very short term (0–1 years) (1)
<b>Magnitude</b>	Moderate and will result in processes continuing but in a modified way (6)	Minor and will not result in an impact on processes (2)
<b>Probability</b>	Definite (5)	Probable (3)
<b>Significance</b>	<b>Medium (60)</b>	<b>Low (12)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes, although this impact cannot be well mitigated as some level of pollution is unavoidable, notably where powerline pylons and roads are to be built within drainage areas.	

**Mitigation:**

The following powerline and road mitigation measures are provided:

- The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.
- The pylons must be constructed outside of the delineated drainage network by spanning overhead of these sensitive areas. This avoidance measure limits pylons from being built within or near drainage features, notably the active channel.
- The realignment of the powerlines within the Western Tributary to a perpendicular orientation would result in a lower number of powerline pylons located directly within the Western Tributary and buffer area.
- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be completely avoided.

- Install sedimentation/erosion protection measures prior to construction in the form of several rows of sandbags, silt traps and fences, this is particularly important in the access roads leading to the watercourse and around active working areas for pylons foundations.
- Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.
- Energy dissipation, such as stone berms or blocks must be strategically placed along the road margins for the entire road network as surface runoff leaves the roads and enters the surrounding environment with the potential for severe erosion. The steeper the slope of the road, the more regular the berms should be spaced and can be as close as one meter apart where necessary.
- The road margins should be hydroseeded with vigorous growing indigenous grasses that are drought tolerant to lower erosion of these key areas.
- The section of roads which will traverse the lowest lying areas/potentially wet areas or steeper slopes will be subjected to traffic from vehicles for inspections and maintenance on site with the potential for damage to habitat and erosion and thus require permeable paving. The permeable paving provides a stable platform to carry the loads of service vehicles, increases infiltration and lowers surface runoff, whilst the vegetation growing through the permeable pavers compliments the surrounding vegetation, cumulatively preventing erosion in these key areas.
- An inspection of the pylons, road network and surrounding influenced areas must be completed within 1 month following the end of construction activities and within a week after the first rainfall event. Thereafter, routine monitoring should take place for the life of the project. Should erosion be developing this must be immediately addressed through appropriate and adaptive measures.

**Residual Impacts:**

Some level of pollution is inevitable due to the nature of the construction activities and cannot be entirely mitigated. The residual impact following mitigation would however be low and of short duration for the construction phase.

**Impact Nature: Alteration of catchment hydrology and associated habitat ecology impacts from decommissioning activities**

Decommissioning phase activities that result in the reshaping and change in vegetative cover density for solar infrastructure with associated alterations of slope, runoff velocities, infiltration capacity and sediment movement from baseline conditions. This is expected to occur across the catchment, with associated impacts to slope stability, habitat integrity and ecological function. This is especially of concern due to the high erodibility of catchment soils in this arid environment and keys areas would include active working areas (road network, PV area, grid infrastructure, etc) where bare soils are exposed to washaway.

	<b>Without mitigation (Impact Rating)</b>	<b>With mitigation (Impact Rating)</b>
<b>Extent</b>	Local area (3)	Footprint & surrounding areas (2)
<b>Duration</b>	Permanent (5)	The lifetime of the impact will be of a short duration (2-5 years) (2)
<b>Magnitude</b>	High (processes are altered to the extent that they temporarily cease) (8)	Low and will cause a slight impact on processes (4)
<b>Probability</b>	Definite (5)	Probable (3)
<b>Significance</b>	<b>High (80)</b>	<b>Low (24)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	None	Moderate
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes, although this impact cannot be well mitigated as the hydrology alterations are unavoidable and long term. However, the construction footprint can be realigned to avoid watercourses and associated buffers	

**Mitigation:**

The following powerline and road mitigation measures are provided:

- The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.
- The pylons must be constructed outside of the delineated drainage network by spanning overhead of these sensitive areas. This avoidance measure limits pylons from being built within or near drainage features, notably the active channel.
- The realignment of the powerlines within the Western Tributary to a perpendicular orientation would result in a lower number of powerline pylons located directly within the Western Tributary and buffer area.
- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be completely avoided.
- Install sedimentation/erosion protection measures prior to construction in the form of several rows of sandbags, silt traps and fences, this is particularly important in the access roads leading to the watercourse and around active working areas for pylons foundations.
- Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.
- Energy dissipation, such as stone berms or blocks must be strategically placed along the road margins for the entire road network as surface runoff leaves the roads and enters the surrounding environment with the potential for severe erosion. The steeper the slope of the road, the more regular the berms should be spaced and can be as close as one meter apart where necessary.
- The road margins should be hydroseeded with vigorous growing indigenous grasses that are drought tolerant to lower erosion of these key areas.
- The section of roads which will traverse the lowest lying areas/potentially wet areas or steeper slopes will be subjected to traffic from vehicles for inspections and maintenance on site with the potential for damage to habitat and erosion and thus require permeable paving. The permeable paving provides a stable platform to carry the loads of service vehicles, increases infiltration and lowers surface runoff, whilst the vegetation growing through the permeable pavers compliments the surrounding vegetation, cumulatively preventing erosion in these key areas.
- An inspection of the pylons, road network and surrounding influenced areas must be completed within 1 month following the end of construction activities and within a week after the first rainfall event. Thereafter, routine monitoring should take place for the life of the project. Should erosion be developing this must be immediately addressed through appropriate and adaptive measures.

**Residual Impacts:**

Alteration of the catchment hydrology is inevitable due to the nature of the construction activities and cannot be entirely mitigated. The residual impact following mitigation would however be low and of short duration for the construction phase.

**7.3.4 Overall Result**

As a result of the ephemeral nature of the watercourses and susceptibility to erosion, the construction and operation phase activities could influence the hydrology, water quality and soil movement within the affected watercourses, notably where the proposed power line infrastructure traverses these aquatic features and their associated 50 m buffer. Provided the power line route is designed so that the pylons are located outside of no-go zones (where feasible), the project will present limited residual impacts to the watercourses.

Based on the survey findings, the specialist agrees with the "Very High" aquatic theme sensitivity as per the National Web based Environmental Screening Tool. The project infrastructure does potentially pose a risk to the watercourses. However, it is the specialist's opinion that following the implementation of avoidance mitigation, recommendations and remedial measures, the risks can be lowered to an acceptable level of impact. Therefore, authorisation of the proposed development can be considered by the authorities provided that the recommended mitigation measures are implemented.

## **7.4 Assessment of Impacts on Avifauna**

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

### **7.4.1. Results of the Avifauna Impact Assessment**

The SABAP2 data indicates that a total of 162 species could potentially occur within the broader area where the project is located (see Appendix 1 of the Avifauna Impact Assessment). Of these, 76 are classified as priority species for solar developments. Of the 76 priority species, 45 have a medium to high probability of occurring regularly in the Project Site, and 21 of the priority species were recorded during the field monitoring. Five Red Data species were recorded during the site surveys, namely Cape Vulture (Globally and Regionally Endangered), Lanner Falcon (Regionally Vulnerable), Martial Eagle (Globally and Regionally Endangered), Secretarybird (Globally Endangered, Regionally Vulnerable), and Tawny Eagle (Globally Vulnerable, Regionally Endangered).

Pre-construction avifaunal surveys were carried out at the project site between the dates of 3–5 February 2022 (Survey 1) and 4–8 April 2022. (Survey 2). Surveys were conducted according to an adapted Regime 2 site as defined in the Solar Guidelines (Jenkins *et al.* 2017) i.e., a minimum of two surveys conducted over 6 months. 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 entire Project Site is a high sensitivity zone due to the potential presence of several SCC including African Rock Pipit, Black Stork, Blue Crane, Cape Vulture, Greater Flamingo, Karoo Korhaan, Lanner Falcon, Ludwig's Bustard, Martial Eagle, Secretarybird, Tawny Eagle, and Verreaux's Eagle which could utilise the whole Project Site for foraging. However, these species do not require specific avoidance measures at this stage because there is still adequate habitat available outside the Project Site.

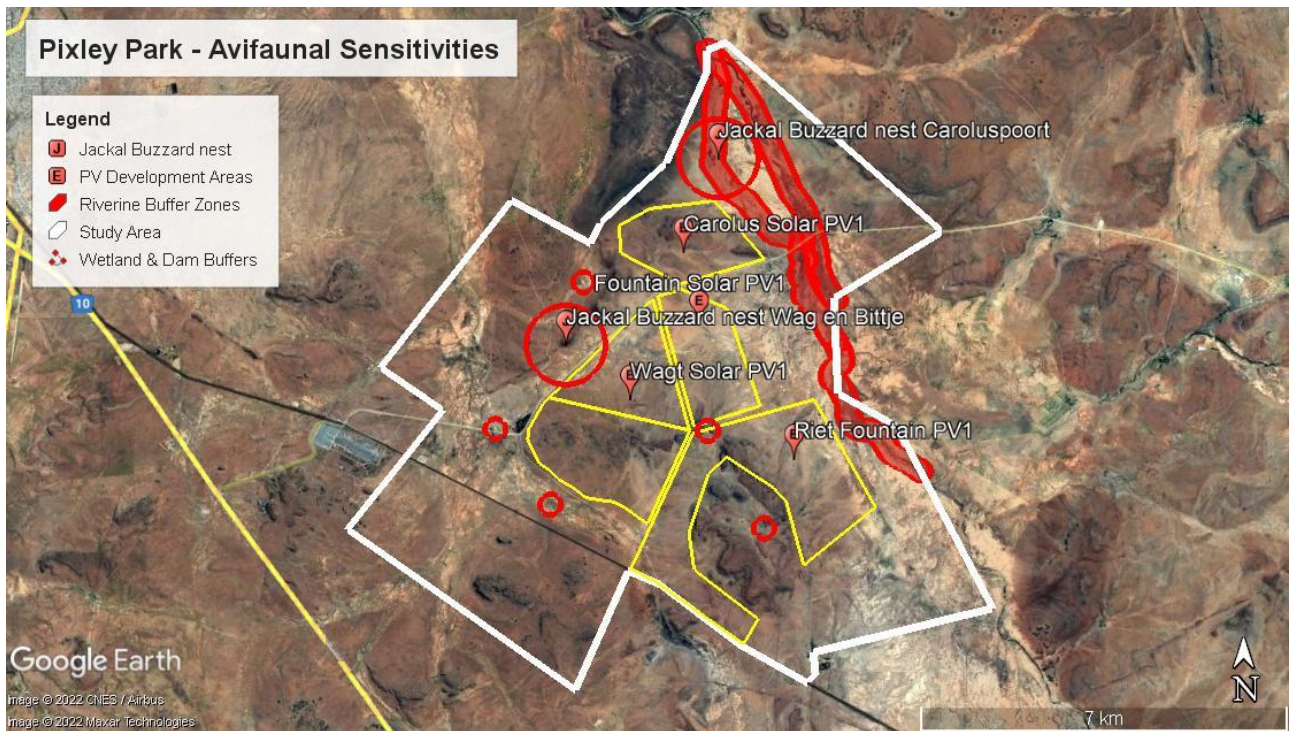


Figure 7.4: Sensitivity locations within the study area

At a site-specific level, environmentally sensitive features present within the proposed study area include the existing Jackal Buzzard nests. These areas are classified as areas of **HIGH** sensitivity. Construction in the areas containing Jackal Buzzard nests will need to be carefully managed to ensure minimal disturbance to the breeding birds and/or their progeny. Site specific recommendations for the management of the disturbance and collision impacts associated with these **HIGH** sensitivity areas has been provided by the specialist following the pre-construction avifaunal walk-through (inspection) (refer to **Appendix 4** of the avifauna impact assessment).

The following buffers are recommended:

» **All infrastructure exclusion zones:**

Jackal Buzzard nests: A 750m all infrastructure exclusion zone is recommended to prevent the displacement of the breeding pair during the construction phase due to disturbance. In addition, the buffer area will reduce the risk of injury to the juvenile bird due to collision with the solar panels, when it starts flying and practicing its hunting technique around the nest.

» **Solar panel exclusion zones (other infrastructure allowed):**

Riverine and wetland habitat: A 200m solar panel free buffer zone must be implemented around riverine areas, wetlands, and dams to provide unhindered access to the surface water for a variety of priority species. Surface water in this semi-arid habitat is crucially important for priority avifauna and many non-priority species. It is important to leave open space with no solar panels for birds to access and leave the surface water area unhindered. Surface water is also an important area for raptors to hunt birds which congregate around surface water, and they should have enough space for fast aerial pursuit. This will also benefit species like Blue Cranes which prefer to breed close to water bodies.



**7.4.2. 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 of priority species due to disturbance associated with construction of the Carolus EGI and associated infrastructure; and
- » The displacement of priority species due to habitat transformation associated with construction of the Pixley Park PV plants and associated infrastructure.

Operation Phase

- » Entrapment of large-bodied birds in the double perimeter fence lines of the Carolus EGI; and
- » Mortality of priority species due to electrocution on the medium voltage internal reticulation networks.
- » Mortality of priority species due to collisions with the medium voltage internal reticulation networks

Decommissioning Phase

- » Displacement of priority species due to disturbance associated with decommissioning of the Pixley Park PV plants and associated infrastructure.

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

**Construction Phase Impacts**

<b>Nature:</b> Displacement of priority species due to disturbance associated with construction of the Carolus EGI and associated infrastructure.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	(2) local	(2) local
<b>Duration</b>	(1) very short	(1) very short
<b>Magnitude</b>	(8) high	(6) moderate
<b>Probability</b>	(5) definite	(5) definite
<b>Significance</b>	<b>(55) MEDIUM</b>	<b>(45) MEDIUM</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes, but to a limited extent	
<b>Mitigation:</b>		
» Construction 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 solar priority species.		

<ul style="list-style-type: none"> <li>» Measures to control noise and dust should be applied according to current best practice in the industry.</li> <li>» Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum as far as practical.</li> <li>» The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint is concerned.</li> <li>» A 750m all infrastructure exclusion zone must be implemented around the Jackal Buzzard nest Caroluspoort at 30°39'54.80"S 24° 9'37.22"E and Jackal Buzzard nest Wag ten Bittje at 30°41'50.20"S 24° 7'47.94"E</li> </ul>
<p><b>Residual Risks:</b> The residual risk of displacement will be reduced but remain at a medium level after mitigation, if the proposed mitigation is implemented.</p>

<p><b>Nature:</b> During construction: Displacement of priority species due to habitat transformation associated with construction of the Carolus EGI and associated infrastructure.</p>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	(1) site only	(1) site only
<b>Duration</b>	(4) long term	(4) long term
<b>Magnitude</b>	(8) high	(6) moderate
<b>Probability</b>	(5) definite	(4) improbable
<b>Significance</b>	<b>(65) HIGH</b>	<b>(44) MEDIUM</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To a limited extent	
<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>» Maximum used should be made of existing access roads and the construction of new roads should be kept to a minimum.</li> <li>» The mitigation measures proposed by the biodiversity and vegetation specialists must be strictly implemented.</li> </ul>		
<p><b>Residual Risks:</b> The residual risk of displacement will be reduced after mitigation but will remain for some species due to the change in habitat.</p>		

## Operation Phase Impacts

<p><b>Nature:</b> Entrapment of large-bodied birds in the double perimeter fence lines of the Pixley Park PV plants.</p>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	(2) local	(2) local
<b>Duration</b>	(4) long term	(4) long term
<b>Magnitude</b>	(6) moderate	(4) low
<b>Probability</b>	(3) possible	(2) improbable
<b>Significance</b>	<b>(36) MEDIUM</b>	<b>(20) LOW</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes	
<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>» It is recommended that a single perimeter fence is used</li> <li>» Increasing the spacing between at least the top two wires (to a minimum of 30cm) and ensuring they are correctly tensioned will reduce the snaring risk for owls</li> </ul>		
<p><b>Residual Risks:</b></p>		

The residual risk of electrocution will be low once mitigation is implemented.

<b>Nature:</b> Mortality of priority species due to electrocution on the medium voltage internal reticulation networks		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	(2) local	(2) local
<b>Duration</b>	(4) long term	(4) long term
<b>Magnitude</b>	(8) high	(4) low
<b>Probability</b>	(3) possible	(1) very improbable
<b>Significance</b>	<b>(42) MEDIUM</b>	<b>(10) LOW</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>» Use underground cables as much as possible.</li> <li>» A raptor-friendly pole design must be used, and the pole design must be approved by the avifaunal specialist.</li> </ul>		
<b>Residual Risks:</b>		
The residual risk of electrocution will be low once mitigation is implemented.		

<b>Nature:</b> Mortality of priority species due to collisions with the medium voltage internal reticulation networks		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	(2) local	(2) local
<b>Duration</b>	(4) long term	(4) long term
<b>Magnitude</b>	(6) medium	(4) low
<b>Probability</b>	(3) possible	(2) improbable
<b>Significance</b>	<b>(36) MEDIUM</b>	<b>(20) LOW</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>» Use underground cables as much as possible.</li> <li>» All internal medium voltage lines must be marked with Eskom approved Bird Flight Diverters according to the latest official Eskom Engineering Instruction.</li> </ul>		
<b>Residual Risks:</b>		
The residual risk of collision will still be present for Ludwig's Bustard, but significantly reduced for other species.		

## Decommissioning Phase Impacts

<b>Nature:</b> Displacement of priority species due to disturbance associated with decommissioning of the Pixley Park PV plants and associated infrastructure.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	(2) local	(2) local
<b>Duration</b>	(1) very short	(1) very short
<b>Magnitude</b>	(8) high	(6) moderate
<b>Probability</b>	(5) definite	(5) definite
<b>Significance</b>	<b>(55) MEDIUM</b>	<b>(45) MEDIUM</b>
<b>Status (positive or negative)</b>	Negative	Negative

<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes, but to a limited extent	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>» Activity should be restricted to the footprint of the infrastructure as far as possible.</li> <li>» Measures to control noise and dust should be applied according to current best practice in the industry.</li> <li>» Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum as far as practical.</li> <li>» Access to the rest of the property must be restricted.</li> <li>» The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint is concerned.</li> </ul>		
<b>Residual Risks:</b>		
The residual risk of displacement will be reduced but remain at a medium level after mitigation, if the proposed mitigation is implemented.		

#### 7.4.4. Overall Result

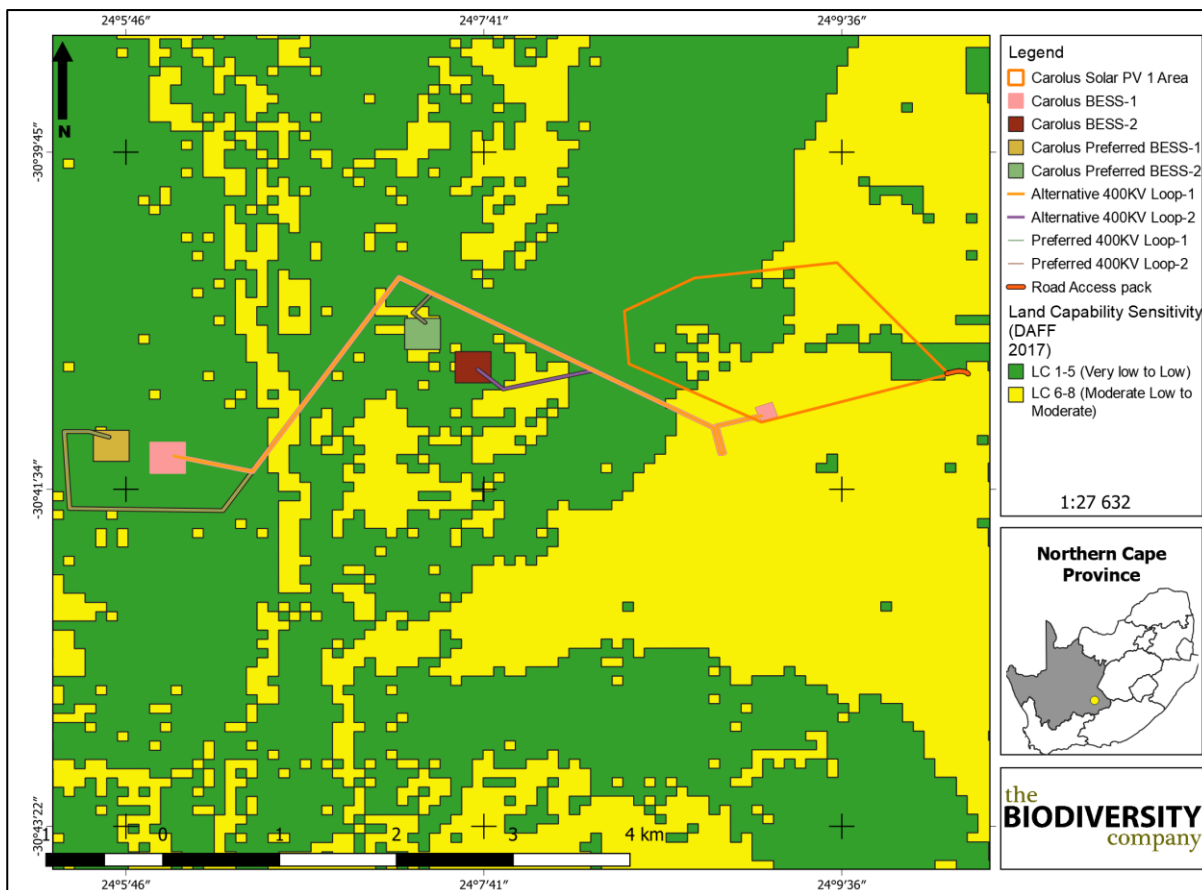
The expected impacts of the Carolus EGI were rated to be of MEDIUM significance and negative status pre-mitigation. However, with appropriate mitigation, the overall post-mitigation significance of the identified impacts would be reduced to LOW negative. No fatal flaws were discovered during the investigation. It is therefore recommended that the activity is authorised, on condition that the proposed mitigation measures are strictly implemented.

### 7.5 Assessment of Impacts on Land Use, Soils and Agricultural Potential

The development of the Carolus 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).

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

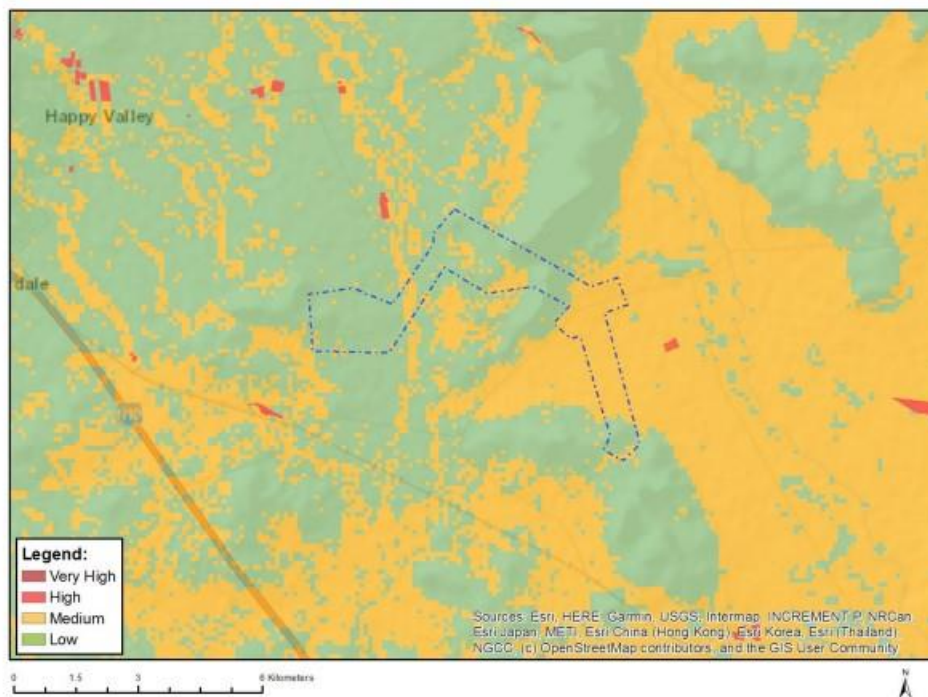
Various soil forms were identified within the project area with the most sensitive soils being classified as the Hutton and Oakleaf, with other associated soils also occurring. The land capability sensitivities (DAFF, 2017) indicate land capabilities with “Very Low to Moderate” sensitivities (refer to **Figure 7.5**). The available climate can limit crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area. The area is not favourable for most cropping practices.



**Figure 7.5:** Land capability sensitivity of the grid connection corridor (DAFF, 2017)

According to the National Web based Environmental Screening Tool, the proposed development is located within a “Medium” sensitivity land capability area. The protocols for minimum requirements (DEA, 2020) stipulates that in the event that a proposed development is located within “Low” or “Medium” sensitivities, an agricultural compliance statement will be sufficient. It is worth noting that according to these protocols, a site inspection will still need to be conducted to determine the accuracy of these sensitivities. After acquiring baseline information pertaining to soil resources within the 50 m regulated areas, it is the specialist’s opinion that the soil forms and associated land capabilities concur with the sensitivities stated by the screening tool. Therefore, only an agricultural compliance statement will be compiled.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

Figure 7.6: Screening Tool results for the agriculture theme sensitivity DFFE (2022).

7.5.2 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 power line and substation 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 operation phase, limited impacts are foreseen. Maintenance of vegetation as well as the occasional maintenance of the power line 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.

### **7.5.3 Impact on land use, soils and agricultural potential during construction, operation and decommissioning (with and without mitigation)**

Even though there might be negative impacts associated with the construction and operation phases of the EGI, the impacts are of low to medium significance. If the correct mitigation measures are to be followed during and after the construction and operation phases the overall impacts can be of acceptable ratings, however it should be taken into account that the Karoo may take decades to rehabilitate, therefore rehabilitation may be challenging, highlighting the need to avoid disturbance of these areas as far as possible.

No significant impacts are identified for the decommissioning phase.

### **7.5.4 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.

It is the specialist's opinion that based on the DAFF (2017) land capability sensitivity of the areas the proposed project will have limited impact on the agricultural production ability of the land. Additionally, the proposed activities for the project will not result in the segregation of any high production agricultural land. The available areas with high crop field boundary sensitivity (DFFE Screening Tool, 2022) are located outside the proposed project area as well. Therefore, the proposed project may be favourably considered.

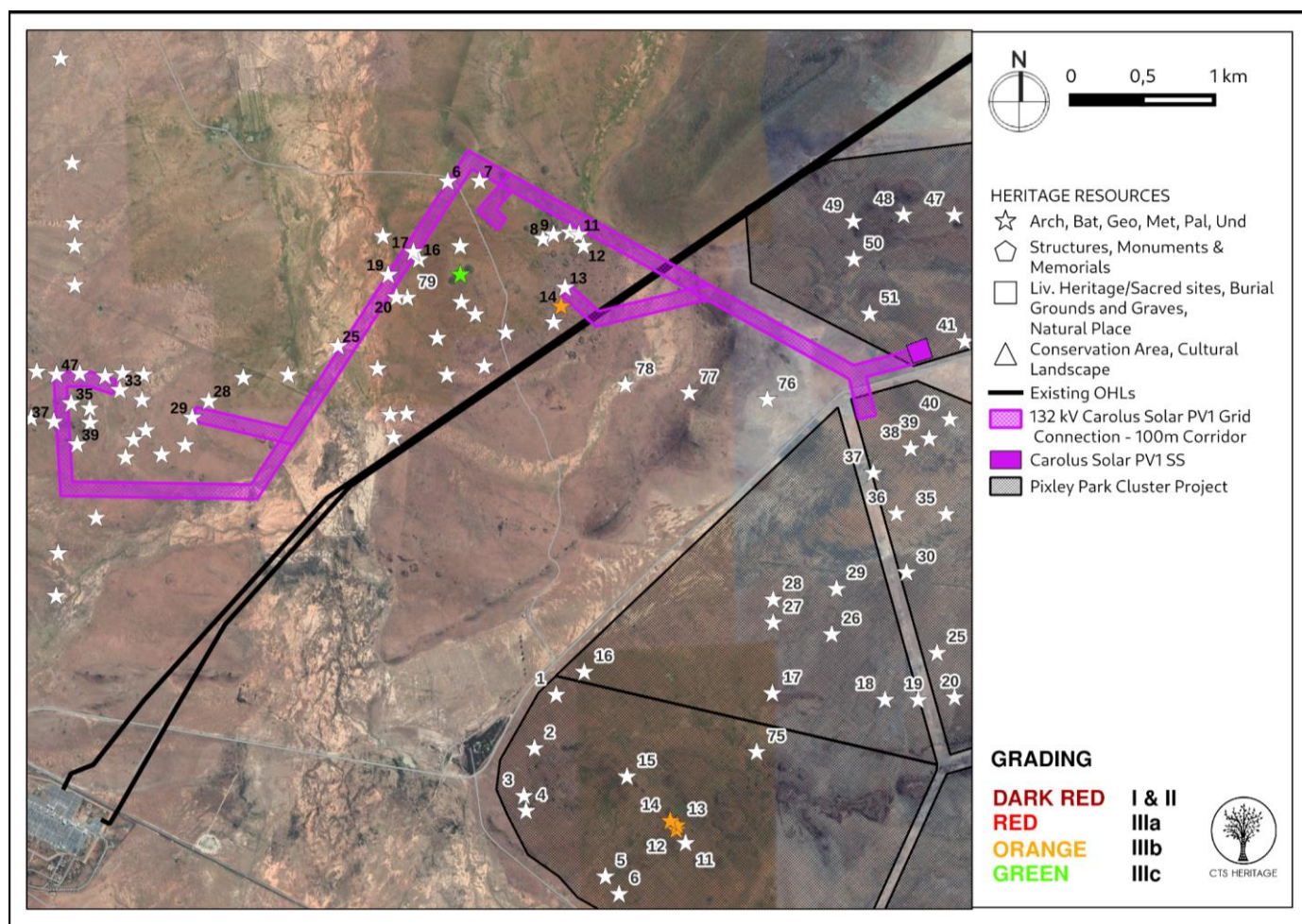
## **7.6 Assessment of Impacts on Heritage (including Archaeology and Palaeontology)**

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

### **7.6.1. Results of the Heritage Impact Assessment**

#### Archaeology

The results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Kruger, 2012). All of the archaeological resources identified within the area proposed for the Carolus EGI in this field assessment have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the proposed development in these locations from an archaeological perspective. The construction of powerlines is not impactful on archaeological sites and the siting of pylons can be made through most of the area without causing significant damage to archaeological sites. The only significant site located in close proximity to the proposed grid alignment is site 014 which is described as "LSA and MSA site with mainly LSA hornfels flakes and pottery". This site has been graded IIIB and a no-development buffer of 100m is recommended around this site.



**Figure 7.7:** Map of heritage resources identified during the field assessment, relative to the proposed development. The sites marked as WHITE are not considered to be conservation-worthy

### Palaeontology

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and some do contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils. Almond (2010) found no fossils of significance during his site visit to Vetlaagte, and the Wag 'n Bietjie farm has the same lithology. It is unknown what lies below the surface. Based on previous surveys in the area, the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be low to moderate.

### 7.6.2. 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 Carolus 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.



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

#### Archaeology

<b>NATURE:</b> It is possible that buried archaeological resources may be impacted by the proposed development in the preferred location				
		<b>Without Mitigation</b>		<b>With Mitigation</b>
<b>MAGNITUDE</b>	<b>L (3)</b>	No archaeological resources of significance were identified within the development area.	<b>L (3)</b>	No archaeological resources of significance were identified within the development area.
<b>DURATION</b>	<b>H (5)</b>	Where manifest, the impact will be permanent.	<b>H (5)</b>	Where manifest, the impact will be permanent.
<b>EXTENT</b>	<b>L (1)</b>	Limited to the development footprint	<b>L (1)</b>	Limited to the development footprint
<b>PROBABILITY</b>	<b>L (1)</b>	It is likely that resources will be impacted	<b>L (1)</b>	It is unlikely that resources will be impacted
<b>SIGNIFICANCE</b>	<b>L</b>	$(3+5+1) \times 1 = 9$	<b>L</b>	$(3+5+1) \times 1 = 9$
<b>STATUS</b>		Negative		Negative
<b>REVERSIBILITY</b>	<b>L</b>	Any impacts to heritage resources that do occur are irreversible	<b>L</b>	Any impacts to heritage resources that do occur are irreversible
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	<b>H</b>	Likely	<b>L</b>	Not Likely
<b>CAN IMPACTS BE MITIGATED</b>		Yes		
<b>MITIGATION:</b>				
<ul style="list-style-type: none"> <li>» A 100m no-go development area must be implemented around site 014</li> <li>» Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.</li> </ul>				
<b>RESIDUAL RISK:</b>				
None				

#### Palaeontology

<b>NATURE:</b> It is possible that buried palaeontological resources may be impacted by the proposed development in the preferred location				
		<b>Without Mitigation</b>		<b>With Mitigation</b>
<b>MAGNITUDE</b>	<b>L (1)</b>	According to the SAHRIS Palaeosensitivity Map (refer to Figure 4 of the Heritage Impact Assessment, Appendix H), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity.	<b>L (1)</b>	According to the SAHRIS Palaeosensitivity Map (Figure 4), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity.
<b>DURATION</b>	<b>H (5)</b>	Where manifest, the impact will be permanent.	<b>H (5)</b>	Where manifest, the impact will be permanent.
<b>EXTENT</b>	<b>L (1)</b>	Limited to the development footprint	<b>L (1)</b>	Limited to the development footprint

<b>PROBABILITY</b>	<b>L (1)</b>	It is unlikely that significant fossils will be impacted	<b>L (1)</b>	It is unlikely that significant fossils will be impacted
<b>SIGNIFICANCE</b>	<b>L</b>	(1+5+1)x1=7	<b>L</b>	(1+5+1)x1=7
<b>STATUS</b>		Negative		Negative
<b>REVERSIBILITY</b>	<b>L</b>	Any impacts to heritage resources that do occur are irreversible	<b>L</b>	Any impacts to heritage resources that do occur are irreversible
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	<b>L</b>	Unlikely	<b>L</b>	Not Likely
<b>CAN IMPACTS BE MITIGATED</b>		Yes		
<b>MITIGATION:</b>				
<ul style="list-style-type: none"> <li>» The Chance Fossil Finds Procedure included in the HIA (Appendix H) must be implemented for the duration of construction activities.</li> <li>» Should any previously unrecorded palaeontological resources be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.</li> </ul>				
<b>RESIDUAL RISK:</b>				
None				

#### 7.6.4. Overall Result

The overall archaeological sensitivity of the development area with regard to the preservation of Early, Middle and Later Stone Age archaeology as well as Khoe and San heritage, early colonial settlement is regarded as very high. Despite this, the field assessment conducted for this project has demonstrated that the specific area proposed for development has low sensitivity for impacts to significant archaeological heritage. The results of this assessment align with the findings of other specialists such as Morris (2011) who notes that ephemeral MSA and LSA scatters are the dominant archaeological signature of the area and the majority of these are therefore not archaeologically significant. In general, the construction of power lines is not impactful on archaeological sites and the siting of pylons can be made throughout most of the area without causing significant damage to archaeological sites.

It is not anticipated that the proposed development of the grid connection infrastructure will negatively impact on significant heritage resources. There is no objection to the proposed development as described above in terms of impacts to heritage resources on condition that:

- » A 100m no-go development area must be implemented around site 014.
- » The attached Chance Fossil Finds Procedure is implemented for the duration of construction activities.
- » Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

#### 7.7 Assessment of Visual Impacts

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

### **7.7.1. Results of the Visual Impact Assessment**

#### Visual distance / observer proximity to the EGI

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger EGI (e.g. 400kV power lines) and downwards for smaller structures (e.g. 132kV power line) 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 EGI) are indicated on Figure 7.8, 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.

The visual distance theory and the observer's proximity to the 132kV power line and substation are closely related, and especially relevant, when considered from areas with a higher viewer incidence and a potentially negative visual perception of the proposed infrastructure.

#### 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. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index.

The criteria which inform the visual impact index are:

- » Visibility or Visual exposure of the structures
- » Observer proximity or Visual distance from the structures
- » The presence of sensitive visual receptors
- » The perceived negative perception or objections to the structures (if applicable)
- » The visual absorption capacity of the vegetation cover or built structures (if applicable)

An area with short distance visual exposure to the proposed grid connection infrastructure, a high viewer incidence and a potentially negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact and determining the potential magnitude of the visual impact.

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.

In general, there are only a limited number of receptor sites within closer proximity (3km) to the proposed project infrastructure. The magnitude of the potential visual impact on these receptor sites are discussed below.

#### Magnitude of the potential visual impact

##### **0 – 0.5km**

The grid connection infrastructure (power line and substation) may have a visual impact of very high magnitude on the following observers:

Site 1: Observers travelling along the secondary road where it traverses adjacent to the power line alignment

*The presence of existing powerlines reduces the probability of this impact occurring, i.e. there is already a visual intrusion and existing visual impact.*

##### **0.5 – 1.5km**

The grid connection infrastructure (power line and substation) may have a visual impact of high magnitude on the following observers:

Residents of/or visitors to:

» Site 2: Vetlaagte

*The presence of existing power lines reduces the probability of this impact occurring, i.e. there is already a visual intrusion and existing visual impact.*

##### **1.5 – 3km**

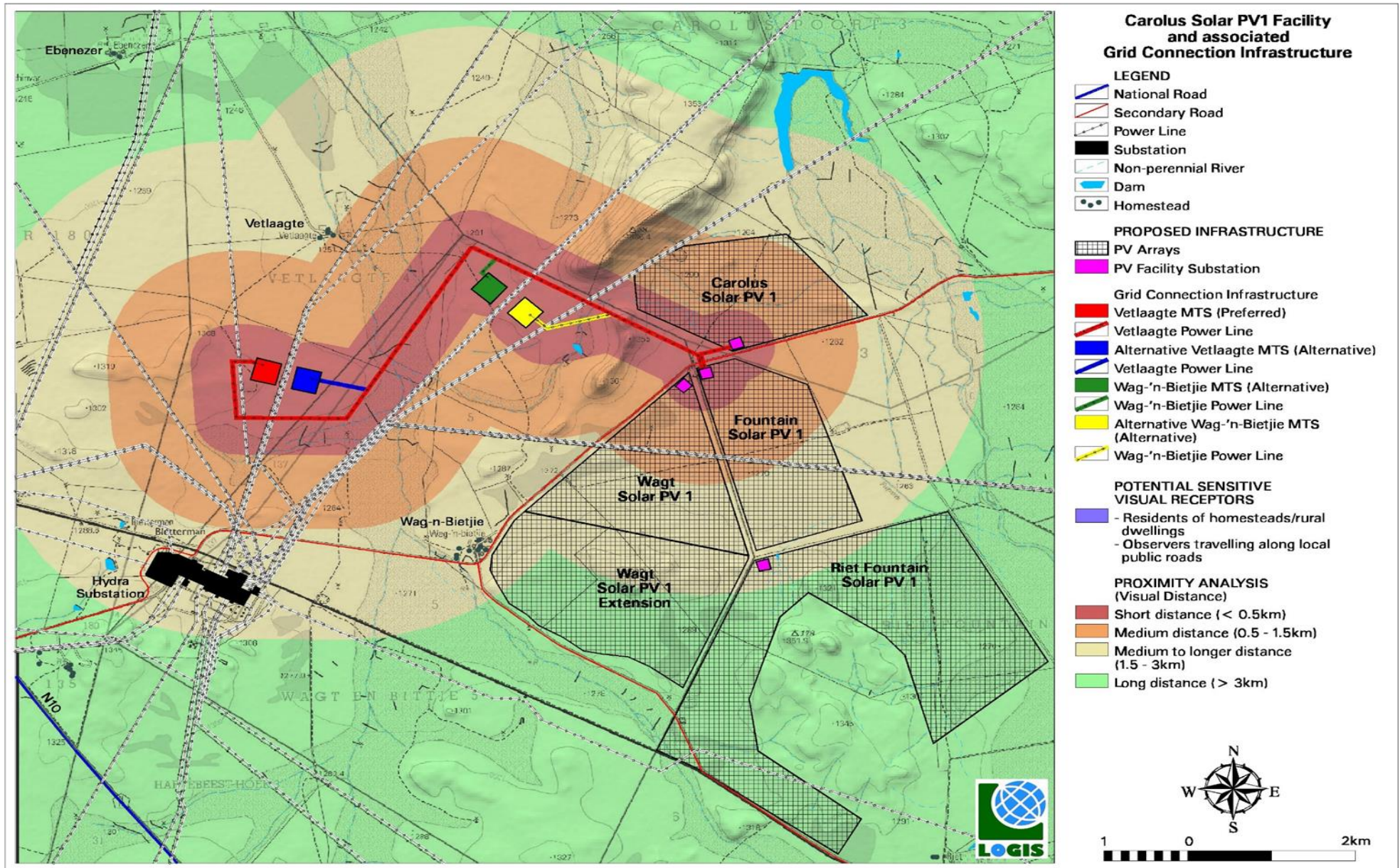
The grid connection infrastructure (power line and substation) may have a visual impact of moderate magnitude on the following observers:

Residents of/or visitors to:

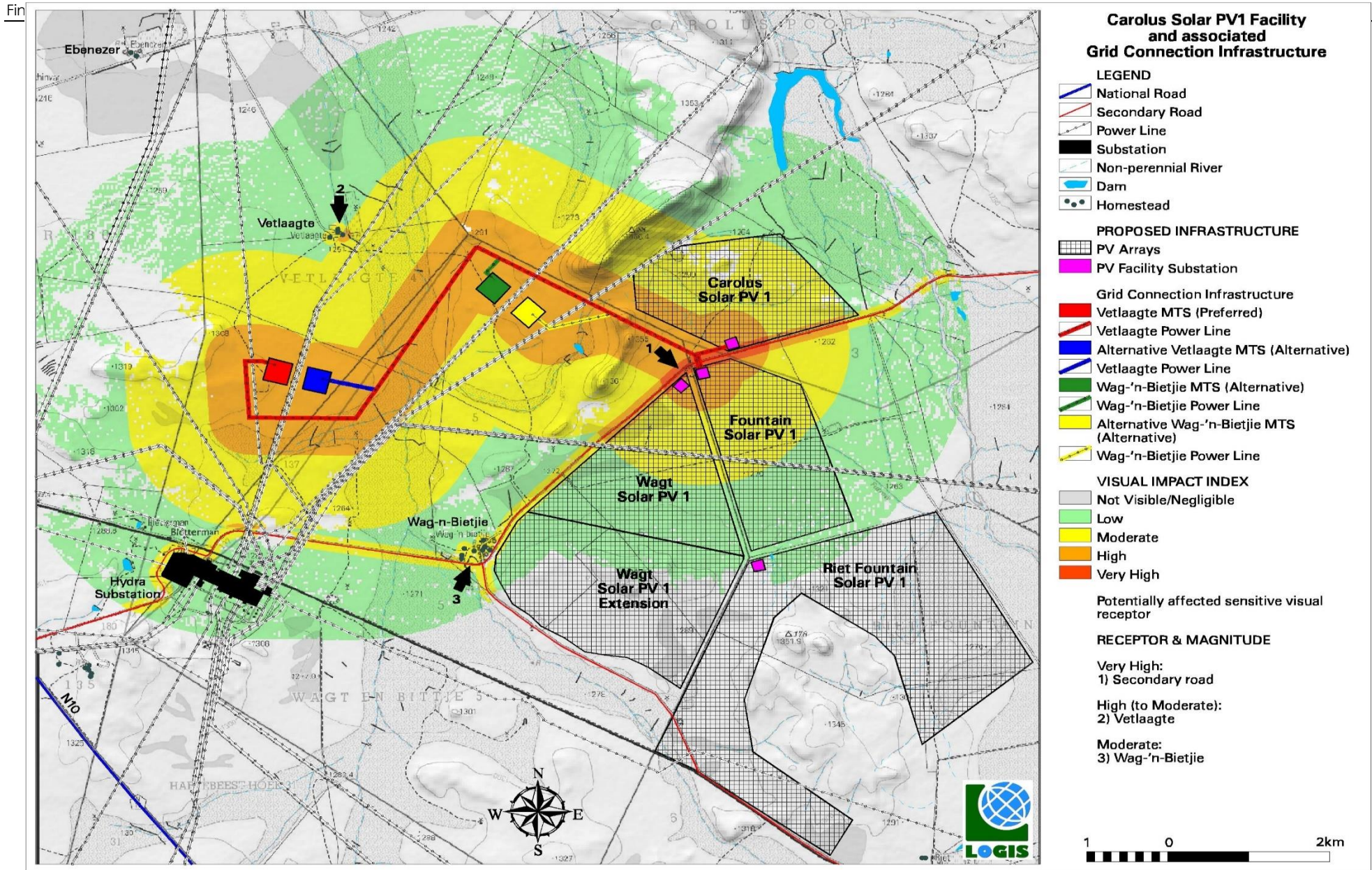
» Site 3: Wag-n-Bietjie

Observers travelling along the secondary road where it traverses adjacent to the power line alignment.

*The presence of existing powerlines and the Hydra substation reduces the probability of this impact occurring i.e., there is already a visual intrusion and existing visual impact.*



**Figure 7.8:** Proximity analysis and potential sensitive visual receptors



**Figure 7.9:** Visual impact index and potentially affected sensitive visual receptors

### 7.7.2. Description of Visual Impacts

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

- » **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 0.5km radius of the grid connection infrastructure during the operational phase:** The grid connection infrastructure is expected to have a **moderate** visual impact (significance rating = 57) on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure. The visual impact of the power line will largely be absorbed by the presence of the existing power lines.
- » **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 (significance rating = 28) on observers traveling along the roads and residents of homesteads within a 1.5 - 3km radius of the infrastructure.
- » **Potential visual impact of associated infrastructure on sensitive visual receptors in close proximity:** The height of the proposed new Vetlaagte or Wag-'n-Bietjie main transmission substation will not exceed 30m in height, therefore the visual exposure of this component will fall within the view sheds generated for the power line infrastructure (which is not expected to exceed 30m). Other associated infrastructure would include access roads and cleared servitudes along the alignments.

Servitudes will need to be maintained along the length of the proposed power line for their entire operational life and access roads will be required both to construct the power line, and to maintain the servitudes (operational phase). These servitudes and access roads have the potential of manifesting as landscape scarring, and thus represent a potential visual impact within the viewshed areas. This is especially relevant for steep slopes where erosion could occur over time. Such erosion and landscape scarring could represent a visual impact.

As access roads and servitudes have no elevation or height, so the visual impact of this associated infrastructure will be absorbed by the visual impact the primary infrastructure.

The grid connection infrastructure is expected to have a moderate visual impact (significance rating = 57) on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure pre mitigation and a low visual impact (significance rating= 30) post mitigation.

- » **Potential visual impact of lighting on sensitive visual receptors in the region:** The grid connection infrastructure is expected to have a moderate visual impact (significance rating = 39) on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure mitigated to low (significance rating= 22).
- » **The potential visual impact of the proposed grid connection infrastructure on the visual landscape and sense of place of the region:** 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 rural and undeveloped character. Settlements, where these occur, are limited in extent and domestic in scale. These vast, generally undeveloped landscapes are considered to have a high visual quality, except where structures (such as power lines and the Hydra substation) represent 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. This is due to the fact that there are numerous powerlines within the study area as well as the existing Hydra substation. However, the potential future development of neighbouring renewable energy projects may drastically change the overall visual impact on the sense of place within the region.

Within the study area there are numerous existing power lines that all congregate at the Hydra Substation. The addition of the proposed powerline will contribute to the overall occurrence of industrial type infrastructure within the region. However, the low incidence of visual receptors within this environment and the relatively remote location of the proposed powerline reduces the probability of this impact occurring.

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

**Construction Phase Impacts**

<b>Nature of Impact:</b> Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.								
	<b>VETLAAGTE MTS AND POWER LINE (PREFERRED)</b>		<b>ALTERNATIVE VETLAAGTE MTS AND POWERLINE (ALT)</b>		<b>WAG-'N-BIETJIE MTS AND POWERLINE (ALT)</b>		<b>ALTERNATIVE WAG-'N-BIETJIE MTS AND POWERLINE (ALT)</b>	
	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>
<b>Duration</b>	Short term <b>(2)</b>	Short term <b>(2)</b>	Short term <b>(2)</b>	Short term <b>(2)</b>	Short term <b>(2)</b>	Short term <b>(2)</b>	Short term <b>(2)</b>	Short term <b>(2)</b>
<b>Magnitude</b>	Very High <b>(10)</b>	Low <b>(4)</b>	Very High <b>(10)</b>	Low <b>(4)</b>	Very High <b>(10)</b>	Low <b>(4)</b>	Very High <b>(10)</b>	Low <b>(4)</b>
<b>Probability</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>
<b>Significance</b>	<b>Moderate (48)</b>	<b>Low (20)</b>	<b>Moderate (48)</b>	<b>Low (20)</b>	<b>Moderate (48)</b>	<b>Low (20)</b>	<b>Moderate (48)</b>	<b>Low (20)</b>
<b>Status (positive/negative)</b>	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative



<b>Reversibility</b>	Reversible (1)	Reversible (1)	Reversible (1)	Reversible (1)	Reversible (1)	Reversible (1)	Reversible (1)	Reversible (1)
<b>Irreplaceable loss of resources</b>	No	No	No	No	No	No	No	No
<b>Can impacts be mitigated?</b>	Yes							
<b>Mitigation:</b>								
<u>Planning:</u>								
» Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude.								
<u>Construction:</u>								
» 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.								
<b>Residual:</b>								
None. The visual impact of the power line and substation will be removed after decommissioning. If the substation and lines are not decommissioned and removed, then the impact will persist.								

## Operation Phase Impacts

<b>Nature of Impact:</b> Visual impact on observers travelling along the secondary roads in close proximity to the power line and substation structures.								
	VETLAAGTE MTS AND POWER LINE (PREFERRED)		ALTERNATIVE VETLAAGTE MTS AND POWERLINE (ALT)		WAG-'N-BIETJIE MTS AND POWERLINE (ALT)		ALTERNATIVE WAG-'N-BIETJIE MTS AND POWERLINE (ALT)	
	No mitigation	Mitigation considered	No mitigation	Mitigation considered	No mitigation	Mitigation considered	No mitigation	Mitigation considered
<b>Extent</b>	Very short distance (4)	Very short distance (4)	Very short distance (4)	Very short distance (4)	Very short distance (4)	Very short distance (4)	Very short distance (4)	Very short distance (4)
<b>Duration</b>	Permanent (5)	Permanent (5)	Permanent (5)	Permanent (5)	Permanent (5)	Permanent (5)	Permanent (5)	Permanent (5)
<b>Magnitude</b>	Very High (10)	Very High (10)	Very High (10)	Very High (10)	Very High (10)	Very High (10)	Very High (10)	Very High (10)
<b>Probability</b>	Probable (3)	Probable (3)	Probable (3)	Probable (3)	Probable (3)	Probable (3)	Probable (3)	Probable (3)
<b>Significance</b>	Moderate (57)	Moderate (57)	Moderate (57)	Moderate (57)	Moderate (57)	Moderate (57)	Moderate (57)	Moderate (57)
<b>Status (positive/negative)</b>	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative

<b>Reversibility</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>
<b>Irreplaceable loss of resources</b>	No	No	No	No	No	No	No	No
<b>Can impacts be mitigated?</b>	No							
<b>Mitigation:</b>								
<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 infrastructure.								
<u>Decommissioning:</u>								
» Remove infrastructure not required for the post-decommissioning use.								
» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.								
<b>Residual:</b>								
None. The visual impact of the power line and substation will be removed after decommissioning. If the substation and lines are not decommissioned and removed, then the impact will persist.								

<b>Nature of Impact:</b> Visual impact on observers travelling along the roads and residents at homesteads within a 1.5 – 3km radius of the grid connection infrastructure.								
	<b>VETLAAGTE MTS AND POWER LINE (PREFERRED)</b>		<b>ALTERNATIVE VETLAAGTE MTS AND POWERLINE (ALT)</b>		<b>WAG-'N-BIETJIE MTS AND POWERLINE (ALT)</b>		<b>ALTERNATIVE WAG-'N-BIETJIE MTS AND POWERLINE (ALT)</b>	
	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Short distance <b>(3)</b>	Short distance <b>(3)</b>	Short distance <b>(3)</b>	Short distance <b>(3)</b>	Short distance <b>(3)</b>	Short distance <b>(3)</b>	Short distance <b>(3)</b>	Short distance <b>(3)</b>
<b>Duration</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>
<b>Magnitude</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>
<b>Probability</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>
<b>Significance</b>	<b>Low (28)</b>	<b>Low (28)</b>	<b>Low (28)</b>	<b>Low (28)</b>	<b>Low (28)</b>	<b>Low (28)</b>	<b>Low (28)</b>	<b>Low (28)</b>
<b>Status (positive/negative)</b>	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
<b>Reversibility</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>
<b>Irreplaceable loss of resources</b>	No	No	No	No	No	No	No	No

<b>Can impacts be mitigated?</b>	No
<p><b>Mitigation:</b></p> <p><u>Planning:</u></p> <p>» Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.</p> <p><u>Operations:</u></p> <p>» Maintain the general appearance of the servitude as a whole.</p> <p><u>Decommissioning:</u></p> <p>» Remove infrastructure not required for the post-decommissioning use.</p> <p>» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.</p>	
<p><b>Residual:</b></p> <p>None. The visual impact of the power line and substation will be removed after decommissioning. If the substation and lines are not decommissioned and removed, then the impact will persist.</p>	

<b>Nature of Impact:</b> Potential visual impact of associated infrastructure on sensitive visual receptors in close proximity								
	<b>VELLAAGTE MTS AND POWER LINE (PREFERRED)</b>		<b>ALTERNATIVE VETLAAGTE MTS AND POWERLINE (ALT)</b>		<b>WAG-'N-BIETJIE MTS AND POWERLINE (ALT)</b>		<b>ALTERNATIVE WAG-'N-BIETJIE MTS AND POWERLINE (ALT)</b>	
	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>	Very short distance <b>(4)</b>
<b>Duration</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>	Permanent <b>(5)</b>
<b>Magnitude</b>	Very High <b>(10)</b>	Moderate <b>(6)</b>	Very High <b>(10)</b>	Moderate <b>(6)</b>	Very High <b>(10)</b>	Moderate <b>(6)</b>	Very High <b>(10)</b>	Moderate <b>(6)</b>
<b>Probability</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>
<b>Significance</b>	Moderate <b>(57)</b>	Low <b>(30)</b>	Moderate <b>(57)</b>	Low <b>(30)</b>	Moderate <b>(57)</b>	Low <b>(30)</b>	Moderate <b>(57)</b>	Low <b>(30)</b>
<b>Status (positive/negative)</b>	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
<b>Reversibility</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>
<b>Irreplaceable loss of resources</b>	No	No	No	No	No	No	No	No
<b>Can impacts be mitigated?</b>	Yes							
<p><b>Mitigation:</b></p> <p><u>Planning:</u></p> <p>» Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude.</p> <p><u>Construction:</u></p> <p>» Ensure that vegetation is not unnecessarily removed during the construction phase.</p>								

<ul style="list-style-type: none"> <li>» 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.</li> <li>» Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads.</li> <li>» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities.</li> <li>» Reduce and control construction dust using appropriate and effective dust suppression techniques as and when required (i.e. whenever dust becomes apparent).</li> <li>» Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.</li> <li>» Rehabilitate all disturbed areas immediately after the completion of construction works.</li> </ul>
<p><b>Residual:</b> None. The visual impact of the power line and substation will be removed after decommissioning. If the substation and lines are not decommissioned and removed, then the impact will persist.</p>

<b>Nature of Impact:</b> Potential visual impact of lighting at night on visual receptors in close proximity to the proposed infrastructure		
	<b>Proposed substation</b>	
	<b>No Mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Short (3)	Short (3)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	Probable (3)	Improbable (2)
<b>Significance</b>	<b>Moderate (39)</b>	<b>Low (22)</b>
<b>Status (positive/negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable (3)	Recoverable (3)
<b>Irreplaceable loss of resources</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	Yes
<p><b>Mitigation:</b>  <u>Planning &amp; operation:</u></p> <ul style="list-style-type: none"> <li>» Shield the sources of light by physical barriers (walls, vegetation, or the structure itself).</li> <li>» Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights.</li> <li>» Make use of minimum lumen or wattage in fixtures.</li> <li>» Make use of down-lighters, or shielded fixtures.</li> <li>» Make use of Low-Pressure Sodium lighting or other types of low impact lighting.</li> <li>» Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.</li> </ul>		
<p><b>Residual impacts:</b> None. The visual impact of the power line and substation will be removed after decommissioning. If the substation and lines are not decommissioned and removed, then the impact will persist.</p>		

<b>Nature of Impact:</b> The potential impact of the development of the proposed grid connection infrastructure on the sense of place of the region.								
	<b>VETLAAGTE MTS AND POWER LINE (PREFERRED)</b>		<b>ALTERNATIVE VETLAAGTE MTS AND POWERLINE (ALT)</b>		<b>WAG-'N-BIETJIE MTS AND POWERLINE (ALT)</b>		<b>ALTERNATIVE WAG-'N-BIETJIE MTS AND POWERLINE (ALT)</b>	
	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>	<b>No mitigation</b>	<b>Mitigation considered</b>

<b>Extent</b>	Medium <b>(2)</b>	Medium <b>(2)</b>	Medium <b>(2)</b>	Medium <b>(2)</b>	Medium <b>(2)</b>	Medium <b>(2)</b>	Medium <b>(2)</b>	Medium <b>(2)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>	Long term <b>(4)</b>	Long term <b>(4)</b>	Long term <b>(4)</b>	Long term <b>(4)</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>
<b>Probability</b>	Improbabl e <b>(2)</b>	Improbabl e <b>(2)</b>	Improbabl e <b>(2)</b>	Improbabl e <b>(2)</b>	Improbabl e <b>(2)</b>	Improbabl e <b>(2)</b>	Improbabl e <b>(2)</b>	Improbabl e <b>(2)</b>
<b>Significanc e</b>	<b>Low (24)</b>	<b>Low (24)</b>	<b>Low (24)</b>	<b>Low (24)</b>	<b>Low (24)</b>	<b>Low (24)</b>	<b>Low (24)</b>	<b>Low (24)</b>
<b>Status (positive/ negative)</b>	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
<b>Reversibility</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>	Reversible <b>(1)</b>
<b>Irreplaceab le loss of resources</b>	No	No	No	No	No	No	No	No
<b>Can impacts be mitigated?</b>	No							
<b>Mitigation:</b>								
<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.								
<b>Residual:</b>								
None. The visual impact of the power line and substation will be removed after decommissioning. If the substation and lines are not decommissioned and removed, then the impact will persist.								

#### 7.7.4. Overall Result

The construction and operation of the proposed Carolus EGI for the Carolus Solar PV1 Facility may have a visual impact on the study area, especially within a 0.5km radius (and potentially up to a radius of 3km) of the power line structure and substation. The visual impact will differ amongst places, depending on the distance from the infrastructure.

Within the study area there are numerous existing power lines that all congregate at the Hydra Substation. The visual amenity along this infrastructure corridor has already been compromised to a large degree. Admittedly, the frequency of visual exposure to power lines is expected to increase, but it is still preferable to consolidate the linear infrastructure as much as possible. To this end, the cumulative visual impact associated with the proposed grid connection infrastructure is considered to be within acceptable limits.

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.

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.

Four (4) alternatives have been proposed for the Carolus grid connection. Based on the above analyses, taking into consideration sensitive visual receptors within close proximity and existing infrastructure, Wag 'n Bietjie MTS (Alternative)/power line would be the most preferable owing to the shorter length of the power line. However, none of the Project Alternatives are considered fatally flawed from a visual perspective.

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 Carolus EGI is considered to be acceptable from a visual impact perspective.

## **7.8 Assessment of Socio-economic Impacts**

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

### **7.8.1. 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 EGI 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 Carolus EGI is therefore supported by key policy and planning documents.

### **7.8.2. Description of Socio-economic Impacts**

Impacts are expected to occur with the development of the Carolus 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.

Negative impacts during construction include:

- » Impacts associated with the presence of construction workers on local communities.
- » Impact on local farmers and farming operations.
- » Noise, dust, and safety impacts of construction related activities and vehicles.
- » Increased risk of grass fires associated with construction related activities.
- » Noise, dust, and safety impacts associated with construction related activities and vehicles.
- » Impact on productive farmland.

Positive impacts during operation include:

- » Improved energy security and establishment of energy infrastructure.
- » Creation of employment, skills development, and business opportunities.
- » Generate income for landowners.

Negative impacts during operation include:

- » The visual impacts and associated impact on sense of place.
- » Loss of farmland and impact on farming operations.
- » Impact of maintenance activities on farming activities and operations.

The major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

Given the relatively small number of people employed during the operational phase (~ 20), the social impacts at a community level associated with decommissioning will be limited. In addition, potential impacts associated with the decommissioning phase can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

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

#### Construction Phase Impacts

##### Positive Impacts During Construction

<b>Nature:</b> Creation of employment and business opportunities during the construction phase		
	<b>Without Enhancement</b>	<b>With Enhancement</b>
<b>Extent</b>	Local-Regional (2)	Local – Regional (2)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Highly probable (4)
<b>Significance</b>	Low (24)	Medium (32)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	N/A
<b>Irreplaceable loss of resources?</b>	N/A	N/A
<b>Can impact be enhanced?</b>	Yes	

**Enhancement:** In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented:

**Employment**

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- 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 contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.
- Before the construction phase commences the proponent should meet with representatives from the ELM to establish the existence of a skills database for the area. If such a 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 ELM 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 contractors. These companies should be notified of the tender process and invited to bid for project-related work.
- Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information.
- The ELM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.

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

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

Negative Impacts During Construction

<b>Nature:</b> Potential impacts on family structures and social networks associated with the presence of construction workers		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)



<b>Significance</b>	Low (24)	Low (20)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b>Irreplaceable loss of resources?</b>	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<p><b>Mitigation:</b> The potential risks associated with construction workers can be mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the Construction Phase. Aspects that should be covered include:</p> <ul style="list-style-type: none"> <li>• Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.</li> <li>• Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.</li> <li>• The SEP and CHSSP should include a Grievance Mechanism that enables stakeholders to report resolve incidents.</li> <li>• 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.</li> <li>• The proponent should consider the option of establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local ELM Councillor, farmers, and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers.</li> <li>• The proponent and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation.</li> <li>• The proponent and the contractor should implement an HIV/AIDS and COVID-19 awareness programme for all construction workers at the outset of the construction phase.</li> <li>• The construction area should be fenced off before construction commences and no workers should be permitted to leave the fenced off area.</li> <li>• The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contractor to effectively manage and monitor the movement of construction workers on and off the site.</li> <li>• Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks.</li> <li>• 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.</li> <li>• It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site</li> </ul>		
<p><b>Residual impacts:</b> 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.</p>		

<b>Nature:</b> Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (3)	Local (2)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Medium (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (33)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	
<ul style="list-style-type: none"> <li>• <b>Mitigation:</b> Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.</li> <li>• The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area.</li> <li>• 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.</li> <li>• Traffic and activities should be strictly contained within designated areas.</li> <li>• Strict traffic speed limits must be enforced on the farm.</li> <li>• All farm gates must be closed after passing through.</li> <li>• Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties.</li> <li>• The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site.</li> <li>• The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the 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).</li> <li>• 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.</li> <li>• 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.</li> <li>• Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be</li> </ul>		

<p>contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation.</p> <ul style="list-style-type: none"> <li>It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.</li> </ul>
<p><b>Residual impacts:</b> No, provided losses are compensated for.</p>

<p><b>Nature:</b> Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires</p>		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (4)	Local (2)
<b>Duration</b>	Short term (2)	short term (2)
<b>Magnitude</b>	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (36)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, compensation paid for stock and crop losses etc.	Yes, compensation paid for stock and crop losses etc.
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	
<p><b>Mitigation:</b> The mitigation measures include:</p> <ul style="list-style-type: none"> <li>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.</li> <li>Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas.</li> <li>Smoking on site should be confined to designated areas.</li> <li>Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are effectively 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.</li> <li>Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle.</li> <li>Contractor to provide fire-fighting training to selected construction staff. No construction staff, with the exception of security staff, to be accommodated on site overnight.</li> <li>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.</li> </ul>		
<p><b>Residual impacts:</b> No, provided losses are compensated for.</p>		

<b>Nature:</b> Potential noise, dust and safety impacts associated with construction activities and movement of traffic to and from the site		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Short Term (2)	Short Term (2)
<b>Magnitude</b>	Low (4)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (24)	Low (15)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes	Yes
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	
<p><b>Mitigation:</b> The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include:</p> <ul style="list-style-type: none"> <li>• As far as possible, the transport of components to the site along the N1, N12 and R61 should be planned to avoid weekends and holiday periods.</li> <li>• The contractor should inform local farmers and representatives from the ELM and relevant provincial road authorities of dates and times when abnormal loads will be undertaken.</li> <li>• The contractor must ensure that damage caused by construction related traffic to the gravel public roads and local, internal farm roads is repaired on a regular basis throughout the construction phase. The costs associated with the repair must be borne by the contractor.</li> <li>• Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis<sup>10</sup>, adhering to speed limits and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.</li> <li>• 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.</li> <li>• The Contractor should ensure that workers are informed that no waste can be thrown out of the windows while being transported to and from the site. Workers who throw waste out windows should be fined.</li> <li>• The Contractor should be required to collect waste along access roads on a weekly basis.</li> <li>• Waste generated during the construction phase should be transported to the local permitted landfill site.</li> <li>• EMPr measures (and penalties) should be implemented to ensure farm gates are closed at all times.</li> <li>• EMPr measures (and penalties) should be implemented to ensure speed limits are adhered to at all times.</li> </ul>		
<p><b>Residual impacts:</b> 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 not responsible for the damage.</p>		

## Operational Phase Impacts

<sup>10</sup> Treated effluent (non-potable) water should be used for wetting of roads and construction areas

Positive Impacts During Operations

<b>Nature:</b> Development of infrastructure to generate clean, renewable energy		
	<b>Without Enhancement</b>	<b>With Enhancement</b>
<b>Extent</b>	Local, Regional and National (3)	Local, Regional and National (3)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate (6)	Moderate (6)
<b>Probability</b>	Highly Probable (4)	Definite (5)
<b>Significance</b>	Medium (52)	High (65)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	N/A	N/A
<b>Can impact be mitigated?</b>	Yes	
<b>Enhancement:</b> Should the project be approved, the proponent should:		
<ul style="list-style-type: none"> <li>• Implement a skills development and training programme aimed at maximising the number of employment opportunities for local community members.</li> <li>• Maximise opportunities for local content, procurement, and community shareholding</li> </ul>		
<b>Residual impacts:</b> Overall reduction in CO <sub>2</sub> 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.		

<b>Nature:</b> Creation of employment and business opportunities associated with the operational phase		
	<b>Without Enhancement</b>	<b>With Enhancement</b>
<b>Extent</b>	Local and Regional (1)	Local and Regional (1)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Highly Probable (4)
<b>Significance</b>	Low (21)	Medium (32)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	N/A
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be enhanced?</b>	Yes	

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

**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
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Minor (2)	Low (4)
<b>Probability</b>	Probable (3)	Highly Probable (4)
<b>Significance</b>	Low (21)	Medium (36)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	N/A
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be enhanced?</b>	Yes	
<b>Enhancement:</b> Implement agreements with affected landowner.		
<b>Residual impacts:</b> Support for local agricultural sector and farming		

### Negative Impacts During Operations

<b>Nature:</b> Visual impact associated with the proposed grid infrastructure and the potential impact on the area's rural sense of place and adjacent land uses.		
	Without Mitigation	With Mitigation
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate-Low (6-4)	Moderate-Low (6-4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium-Low (33-27)	Medium-Low (33-27)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, grid can be removed.	
<b>Irreplaceable loss of resources?</b>	No	No

<b>Can impact be mitigated?</b>	Yes
<b>Mitigation:</b> Visual Impact Assessment recommendations listed in Appendix I	
<b>Residual impacts:</b> Impact on rural sense of place	

<b>Nature:</b> Potential risk to farming operations and livestock associated with presence of maintenance workers on the site		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (30)	Low (21)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, solar facility can be removed.	
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	
<b>Mitigation:</b> The preferred transmission line alignment		
<b>Residual impacts:</b> No, provided losses are compensated for.		

<b>Nature:</b> Potential risk to farming operations and livestock associated with presence of maintenance workers on the site		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (30)	Low (21)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, solar facility can be removed.	
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	
<b>Mitigation:</b>		

- 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 with maintenance related activities, if due to negligence or proven fault of the operating entity (i.e., Eskom).
- 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.

#### 7.8.4. Overall Result

The findings of the SIA indicate that the development of the proposed Carolus EGI will create employment and business opportunities for locals in the ELM during both the construction and operational phase of the project. All of the potential negative impacts, with the exception of the impact on sense of place, can also be effectively mitigated.

The significance of this impact is rated as **Low Negative with mitigation**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The establishment of proposed EGI for the Pixley Park PV SEF Cluster is therefore supported by the findings of the SIA.

### 7.9 Assessment of Cumulative Impacts

The Carolus 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 Carolus 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.

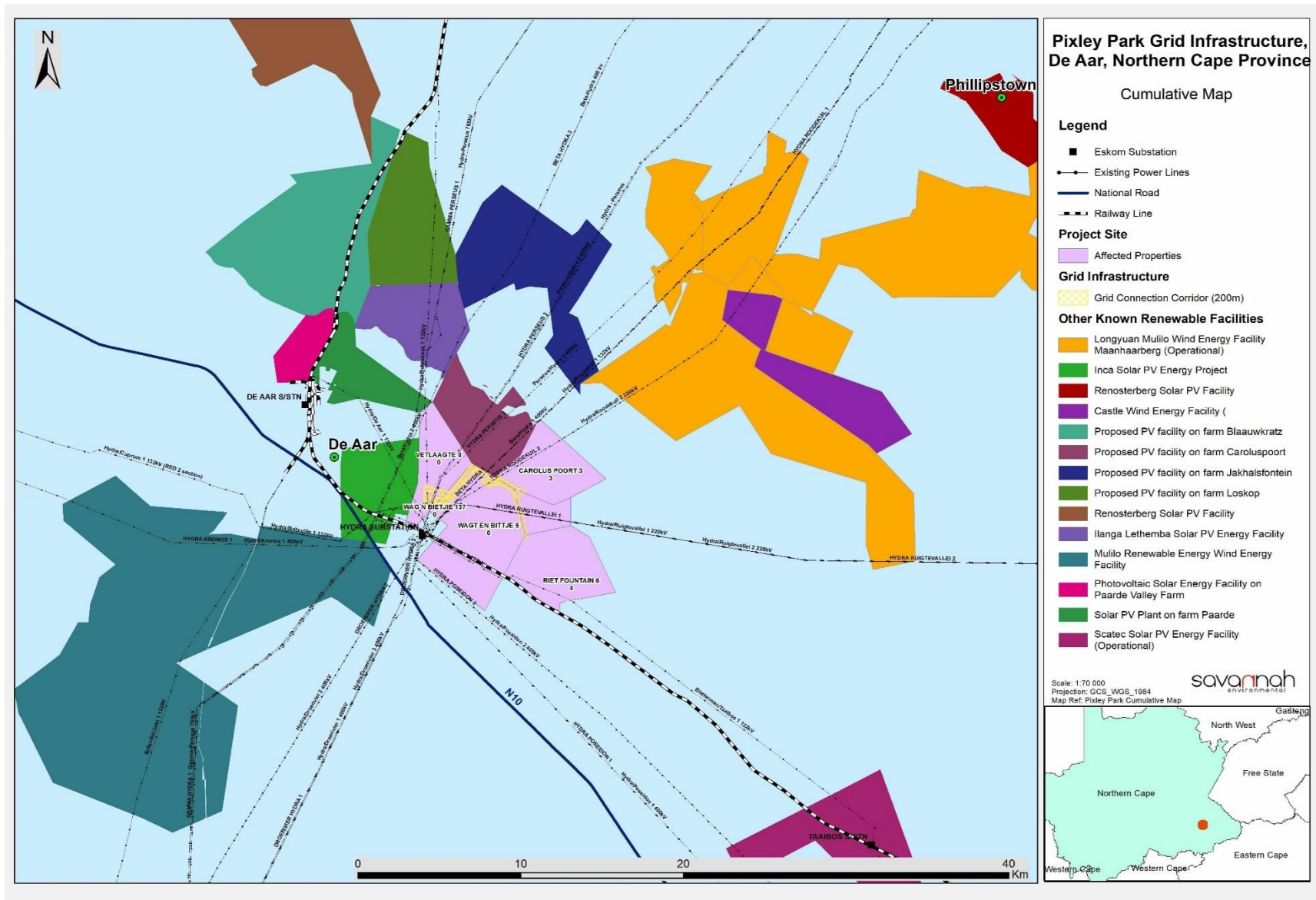
This assessment is based on information currently available and considers impacts from similar developments within the area. The following potential impacts are considered:

- » Cumulative impacts on ecology processes.
- » 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 7.10** indicates the location of the Carolus 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 7.10:** Cumulative map illustrating the proposed EGI and other approved and/or constructed renewable energy facilities located within a 30km radius of the Carolus EGI

### 7.9.1. Cumulative Impact on Ecological Processes

Cumulative impacts are assessed in context of the extent of the proposed development area, other developments in the area, as well as general habitat loss and transformation resulting from other activities in the area. Presently, the surrounding immediate and broader landscape consists of natural vegetation used for supporting livestock and to a lesser extent game. The Phase 1 and Phase 2 REDZs spatial files and the South African Renewable Energy EIA Application Database (DFFEb, 2021) was overlaid onto the Northern Upper Karoo remnants layer. The remnants layer was released as part of the NBA (Skowno *et al*, 2019) and provides the present spatial extent of vegetation. The South African Renewable Energy EIA Application Database contains spatial data for renewable energy applications for environmental authorisation. It includes spatial and attribute information for both active (in process and with valid authorisations) and non-active (lapsed or replaced by amendments) applications. Data is captured and managed on a parcels level as well as aggregated to the project level at the boundary level. Considering the limited extent of approved and in process developments within the Northern Upper Karoo and its 'Not Protected' Status, the expected cumulative impact is expected to be of a 'Medium' significance.

<b>Impact Nature: Cumulative habitat loss within the region</b>		
The development of the proposed Carolus Grid Connection Infrastructure will contribute to cumulative habitat loss within the Northern Upper Karoo and Ecological Support Areas		
	<b>Overall impact of the proposed development considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	Very low (1)	Low (2)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	<b>Medium (36)</b>	<b>Medium (40)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources</b>	No	Yes, in certain cases
<b>Can impacts be mitigated</b>	Yes, to some degree. However, the cumulative impacts on the receiving environment will be regarded as 'High'.	
<b>Mitigation:</b> Ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented. Set-aside areas (Avoidance areas) should be established in order to conserve natural habitats where possible.		

### 7.9.2. Cumulative Impact on Aquatic Ecology

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system. This section describes the potential impacts of the project that are cumulative for freshwater fauna and flora.

Cumulative impacts are assessed in context of the extent of the proposed project area; other solar and EGI developments in the area; and general watercourse and habitat loss and transformation resulting from other activities in the region. There are a number of existing renewable energy developments with existing electrical infrastructure and grid connections in the greater De Aar regional area, with additional energy developments proposed. There are also a number of existing power lines and substations.

The expected post-mitigation risk significance for the project in isolation is expected to be low, but in consideration of the larger project area the overall cumulative impact is expected to be medium. This is expected as the project extends into two quaternary catchment areas. Localised cumulative impacts include the cumulative effects from operations that are close enough (such as nearby farming activities within the area) to potentially cause additive effects on the environment or sensitive receivers. These include disruption of ecological corridors or habitat such as watercourses, impacts to groundwater and surface water quality, and transport of soils and instream habitat smothering impacts.

<b>Impact Nature: Cumulative loss/ disturbance of habitat and ecological functioning of watercourses in the region</b>		
The development of the proposed infrastructure will contribute to cumulative habitat loss within ESAs, watercourses and adjacent habitat together with the potential for increased contaminants and sediment entering the watercourses. The loss/alteration of habitat lowers the buffering capacity of the catchment to water quality impacts, will have negative impacts on the ecological processes of the associated watercourses in the region.		
	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project together with the existing and proposed projects in the area</b>
<b>Extent</b>	Footprint & surrounding areas (2)	Regional (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate and will result in processes continuing but in a modified way (6)	High (processes are altered to the extent that they temporarily cease) (8)
<b>Probability</b>	Improbable (2)	Probable (3)
<b>Significance</b>	<b>Low</b>	<b>Medium</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	None
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes, avoidance of watercourses/drainage network is possible for the project footprint with adherence to buffers.	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>• Ensure that an adaptive EMP be compiled and effectively implemented considering all mitigation presented in this report as well as the associated terrestrial biodiversity report.</li> <li>• Key focus should be placed on stormwater and erosion prevention strategies.</li> <li>• Further mitigation presented in section 7.3 of this report.</li> </ul>		
<b>Residual Impacts:</b>		
Watercourse deterioration over time caused by altered hydro-dynamics, erosion, water quality impacts and alien vegetation infestation and the subsequent loss / deterioration of ecosystem services, despite mitigation. This is a result of the long-term duration for the life of the project.		

### 7.9.3. Cumulative Impact on Avifauna

Cumulative effects are commonly understood to be impacts from different projects that combine to result in significant change in an area, which could be larger than the sum of all the individual impacts. The assessment of cumulative effects therefore needs to consider all renewable energy projects within a 30 km radius that have received an EA at the time of starting the environmental impact process, as well as the

proposed Pixley Park Renewable Energy Project. There are currently 14 renewable energy projects authorised, operational or in process within a 30 km radius around the cluster of four proposed Solar PV Development Areas of the proposed Carolus EGI. There are also a number of existing power lines and substations.

The total affected land parcel area taken up by authorised and planned renewable energy projects within the 30 km radius is approximately 1 316 km<sup>2</sup>. The total affected land parcel area affected by the Pixley Solar Renewable Energy Cluster, of which the Carolus EGI forms part of, equates to approximately 83.2km<sup>2</sup>. The combined land parcel area affected by authorised renewable energy developments within the 30 km radius around the proposed project, including the latter, thus equals approximately 1 399 km<sup>2</sup>. Of this, the proposed project land parcel areas constitute ~5.8%. The cumulative impact of the proposed Carolus EGI is thus anticipated to be low after mitigation.

The total area within the 30km radius around the proposed projects equates to about 4 053 km<sup>2</sup> of similar habitat (excluding developed areas). The total combined size of the land parcels potentially affected by renewable energy projects will equate to ~34.5% of the available untransformed habitat in the 30km radius. Assuming that all the projects are actually constructed, the cumulative impact of all the proposed renewable energy projects is estimated to be medium. However, the actual physical footprint of the renewable energy facilities will be much smaller than the land parcel areas themselves. Furthermore, several of these projects must still be subject to a competitive bidding process where only the most competitive projects will win a power purchase agreement required for the project to proceed to construction.

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

<b>Nature:</b> Cumulative impacts associated with renewable energy facilities and associated grid connection infrastructure		
» Displacement due to disturbance associated with the construction of the renewable energy facility and associated infrastructure		
» Displacement due to habitat transformation associated with the construction and operation of the renewable energy facility and associated infrastructure		
» Collisions with the solar panels		
» Entrapment in perimeter fences		
» Displacement due to disturbance associated with the decommissioning of the renewable energy facilities and associated infrastructure		
» Mortality of priority species due to electrocution on the medium voltage internal reticulation networks		
» Mortality of priority species due to collisions with the medium voltage internal reticulation networks		
	<b>Cumulative impact of the proposed Pixley Park Renewable Energy Project within a 30km radius (post mitigation).</b>	<b>Cumulative impact of other renewable energy projects within a 30km radius (post mitigation)</b>
<b>Extent</b>	(3) regional	(3) regional
<b>Duration</b>	(4) long term	(4) long term
<b>Magnitude</b>	(2) minor	(6) moderate
<b>Probability</b>	(3) probable	(4) highly probable
<b>Significance</b>	<b>(27) LOW</b>	<b>(52) MEDIUM</b>
<b>Status (positive/negative)</b>	Negative	Negative
<b>Reversibility</b>	High	High
<b>Loss of resources?</b>	No	Yes
<b>Can impacts be mitigated?</b>	Yes	

<b>Confidence in findings:</b> Medium.
<b>Mitigation:</b> <ul style="list-style-type: none"><li>» All mitigation measures listed in this report for the Carolus EGI project and all mitigation measures relevant to avifauna listed in the various specialist reports for the other planned projects within a 30km radius of the Carolus EGI project should be followed.</li></ul>

#### **7.9.4. Cumulative Impact on Land Use, Soils and Agricultural Potential**

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which eight potential land capability classes are located within the proposed footprint area's assessment corridors, including;

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

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which is covered by "Very Low" to "Low" sensitivities. Some patches are characterised by "Moderate Low to Moderate" sensitivities. In the assessment area, there is no segregation of agricultural lands or crop fields with high potentials from all the proposed infrastructure, (i.e., power lines, proposed alternative routes, substation). The available crop fields boundary areas with high sensitivity following the DFFE Screening Tool (2022) are found outside the project area. It is also worth noting that, there are limitations on the actual soil properties distribution and field occurrence as the baseline soil assessment results were not presented. Such soil properties are important in the determination of the soil field land capability classes required for the land potential classes (i.e., combination of climate capability level and land capability class). The "Very Low to Moderate" sensitivities fall within the DAFF, (2017) requirements for a compliance statement report only. It is the specialist's conclusion that, the proposed Carolus solar renewable energy facility and associated infrastructure will have limited effects based on the desktop sensitivities and potentials from the DAFF, (2017). Therefore, the project may be favourably considered.

#### **7.9.5. Cumulative Heritage Impact**

The proposed EGI is associated with the development of a group of proposed renewable energy facilities that are located within a cluster of approved renewable energy facilities located outside of De Aar. In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The proposed development is therefore unlikely to result in unacceptable risk or loss, nor will the proposed development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact due to its location as one of many renewable energy facilities in this area.

#### **7.9.6. Cumulative Visual Impact**

The proposed EGI and substation is located in an area where there are numerous existing power lines and the existing Hydra Substation located to the south west of the alignment. The visual amenity along the proposed power line corridor has already been compromised to a large degree. Admittedly, the frequency of visual exposure to power line infrastructure is expected to increase, but it is still preferable to consolidate the linear infrastructure as much as possible. To this end, the cumulative visual impact associated with the proposed power line is considered to be within acceptable limits.

The construction of the Carolus EGI may increase the cumulative visual impact of industrial type infrastructure within the region.

The anticipated cumulative visual impact of the proposed EGI is expected to be of **moderate** significance (significance rating = 42). This is considered to be acceptable from a visual impact perspective.

Within the study area there are numerous existing power lines that all congregate at the Hydra Substation. The addition of the proposed powerline will contribute to the overall occurrence of industrial type infrastructure within the region. However, the low incidence of visual receptors within this environment and the relatively remote location of the proposed powerline reduces the probability of this impact occurring.

<b>Nature of Impact:</b> The potential cumulative visual impact of the grid connection infrastructure on the visual quality of the landscape.		
	<b>Overall impact of the project considered in isolation (with mitigation)</b>	<b>Cumulative impact of the project and other projects within the area (with mitigation)</b>
<b>Extent</b>	Very short distance <b>(4)</b>	Medium to longer distance <b>(2)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	High <b>(8)</b>	High <b>(8)</b>
<b>Probability</b>	Improbable <b>(2)</b>	Probable <b>(3)</b>
<b>Significance</b>	<b>Moderate (32)</b>	<b>Moderate (42)</b>
<b>Status (positive/negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable (3)	Recoverable (3)
<b>Irreplaceable loss of resources</b>	No	No
<b>Can impacts be mitigated?</b>	No	No
<p><b>Mitigation:</b>  <b>Generic best practice mitigation/management measures:</b>  <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.</p>		
<p><b>Residual impacts:</b>                      None. The visual impact of the power line and substation will be removed after decommissioning. If the substation and lines are not decommissioned and removed, then the impact will persist.</p>		

### 7.9.7. Cumulative Social Impact

#### Cumulative impact on sense of place

The findings of the VIA (Logis, July 2022) note the construction of the grid connection infrastructure may increase the cumulative visual impact of industrial type infrastructure within the region. The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of **moderate** significance. This is considered to be acceptable from a visual impact perspective.

The VIA also notes that within the study area there are numerous existing power lines that all congregate at the Hydra Substation. The addition of the proposed powerline will contribute to the overall occurrence

of industrial type infrastructure within the region. However, the low incidence of visual receptors within this environment and the relatively remote location of the proposed powerline reduces the probability of this impact occurring.

<b>Nature:</b> Visual impacts associated with the establishment of more than one transmission line and the potential impact on the area's rural sense of place and character of the landscape.		
	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	Local (1)	Local and regional (2)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (27)	Medium (30)
<b>Status (positive/negative)</b>	Negative	Negative
<b>Reversibility</b>	Yes. Grid infrastructure can be removed.	
<b>Loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Confidence in findings:</b> High.		
Mitigation: Refer to recommendations in Appendix I		

### 7.9.8 Conclusion regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development of the Carolus 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 Carolus 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 Carolus EGI and other renewable energy facilities within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- » There will be no significant loss of sensitive or significant aquatic features, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- » There will be no unacceptable risk to avifauna with the development of the Carolus EGI and other renewable energy projects within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- » There will be no unacceptable loss of land capability due to the development of the Carolus EGI and other renewable energy projects within the surrounding areas, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- » Change to the sense of place and character of the area is expected with the development of renewable energy facilities. 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 Carolus EGI and other developments within the surrounding areas. The cumulative impact is therefore acceptable.
- » No unacceptable socio-economic impacts are expected to occur. The cumulative impact is therefore acceptable.

All cumulative impacts associated with the Carolus EGI will be of a medium or low significance. A summary of the cumulative impacts is included in **Table 7.1** below.

**Table 7.1:** Summary of the cumulative impact significance for the Carolus 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	Medium
Land use, soil and agricultural potential	Low	Medium
Heritage (including archaeology, and palaeontology)	Low	Low
Visual	Moderate	Moderate
Social	Low	Medium

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

### 7.10 Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e., 'no-go' alternative) is the option of not constructing the Carolus 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 Carolus EGI) to cater for the Carolus Solar PV1 Facility (application for environmental authorisation in process, DFFE Ref.: 14/12/16/3/3/2/2154) not being established and will, therefore, render the development of the renewable energy facility and the operation thereof not technically feasible as the facility would not be able to connect to the national grid. This will result in the loss of the opportunity to develop the proposed 120MW renewable energy facility, 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 is considered to outweigh the positive impacts of this alternative. The 'do nothing' alternative is, therefore, not preferred for the development of the Carolus EGI.

## CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS

Carolus Solar PV1 (Pty) Ltd is proposing the development of a 132kV switching station, 132kV power line and associated infrastructure which will enable the evacuation of electricity from the Carolus Solar PV1 Facility (application for environmental authorisation in process, DFFE Ref.: 14/12/16/3/3/2/2154), which forms part of the larger Pixley Park PV Cluster. The project site is located approximately 10km east of De Aar within the Emthanjeni Local Municipality in the Northern Cape Province.

The grid connection infrastructure will consist of:

- » Onsite 132kV Eskom switching station - 100m x 100m and 30m height, metering, relay & control buildings, laydown area, ablutions with conservancy tanks and water storage tanks, and access roads which is handed back to Eskom.
- » 132kV Overhead Power Line (OHPL) – 30m height from the switching station to the Main Transmission Substation (MTS) located on either Vetlaagte (RE/4) or Wag en Bittje (RE/5) farms which will be handed back to Eskom (within 300m wide corridor and a 31m wide servitude).
- » Access roads to substation sites and service tracks (up to 8m wide) where no existing roads are available

One corridor of 300m wide and between 4.3km (to Wagt 'n Bietjie MTS) and 7.8km (to Vetlaagte MTS) long are being considered connecting to either the new Vetlaagte MTS located on the Farm Vetlaagte (RE/4) or Wag-n-Bietjie MTS, located on the Farm Wag en Bittje (RE/5) <sup>11</sup>. The entire extent of the site falls within the Central Corridor of the Strategic Transmission Corridors.

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

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

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

Requirement	Relevant Section
3(1)(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 <b>section 8.2</b> .
3(1)(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	An environmental impact statement containing the key findings of the environmental impacts has been included as <b>section 8.5</b> . Sensitive environmental features located within the grid corridor and substation development footprint are shown in <b>Figure 8.1</b> . A summary of the positive and negative impacts associated with Carolus EGI has been included in <b>section 8.2</b> .

<sup>11</sup> The Vetlaagte MTS and Wag-n-Bietjie MTS are currently being assessed under a separate BAR process.

Requirement	Relevant Section
and negative impacts and risks of the proposed activity and identified alternatives.	
3(1)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 <b>section 8.5 and 8.6</b> .
3(1)(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 Carolus EGI have been included in <b>section 8.6</b> .
3(1)(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 Carolus EGI should be authorised has been included in <b>section 8.6</b> .

## 8.2. Evaluation of the Carolus 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 Carolus EGI. 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 archaeology and 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 grazing and livestock agriculture. A wide range of anthropogenic activities, including roads and the associated vehicle traffic, fence lines and pylons, railway lines, energy distribution infrastructure, and renewable energy facilities, have an impact on the biodiversity in the broader Pixley Park region. Anthropogenic activities drive habitat destruction causing displacement of fauna and flora and possibly direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as

rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the Pixley Park area. The proposal to build an EGI will therefore have some effects on natural habitat.

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 larger Pixley Park site (including the Carolus EGI) is situated in the Grassland and Nama Karoo biomes. The fine scale vegetation types that occur on site, i.e., Northern Upper Karoo, and the Besemkaree Koppies Shrubland, are both widespread and have low rates of transformation across their geographical range. The Plants of South Africa database indicates that 116 species of indigenous plants are expected to occur within the project area and surrounding landscape. None of the species expected are species of conservation concern.

To determine sensitivity on site, local and regional factors were taken into account. The habitat physiognomy within the larger Pixley Park area is diverse and, based on the fauna components recorded within the larger Pixley Park area and proximal landscape, the area provides important ecosystem services, particularly with regards to the maintenance of dynamic soil properties and pollination services. The site ecological importance of the larger Pixley Park area was determined to vary from 'Very Low' to 'Very High' based on the high likelihood of occurrence for near threatened species, the extent of the area considered and its connectivity to natural areas within the landscape, and the low resilience of the vegetation type.

At a regional level, the EGI corridor predominantly overlaps with an Ecological Support Area. ESAs are areas that must be maintained in at least fair ecological condition (semi-natural/moderately modified state) in order to support the ecological functioning of a CBA or protected area, or to generate or deliver ecosystem services, or to meet remaining biodiversity targets for ecosystem types or species when it is not possible or no necessary to meet them in natural or near-natural areas (SANBI, 2016). The nature of the development, i.e., a substation and power line, will lead to the destruction of a portion of the ESA and consequently, the footprint area will be no longer congruent with an ESA.

The main expected impacts of the proposed Carolus EGI will be the loss of habitat and emigration of fauna. Based on the outcomes of the Site Ecological Importance (SEI) determination, there are areas within the study area that possess a 'Very High' SEI. This denotes that avoidance mitigation is the only appropriate option for these areas and no destructive development activities should be considered. There are also areas within the PAOI that possess a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design during micro-siting to limit the amount of habitat impacted.

Based on an evaluation of the 'avoidance' achieved for the project (considering the larger solar cluster and associated EGI), the following is noteworthy:

- » The total extent of the entire project area is 8 200 ha;
- » The footprint areas for the four proposed solar facilities and associated EGI amounts to 2 103 ha, thus approximately 26% of the total project area will be developed.

Taking into consideration the extent of 'avoidance' achieved for the project, it is the opinion of the specialist that the authorisation of the proposed project may be favourably considered, under condition that all mitigation and impact management actions provided within this report are implemented. It is recommended that should any future developments be proposed for the remaining extent of any 'Very

High' or 'High' SEI areas within the associated properties, that offset strategies be required for these authorisations.

### **8.2.2 Impacts on Aquatic Ecology**

Based on a combination of desktop and in-field study several aquatic impacts has been identified in the proposed development area. The 132 kV power line extends from the Carolus PV area in the Brak SQR D62D-5391, across a watershed and into the catchment of a tributary of the Brak River (Brak tributary SQR D62D-5332). The power line infrastructure and all alternatives traverse an unnamed ephemeral/secondary non-perennial watercourse network (Western Tributary) draining in a south-westerly direction into the Brak tributary.

The land uses surrounding the project area predominantly includes farming activities between natural land and land situated between the watercourses. Land use within a catchment influences the ecological integrity of the associated watercourses. Due to the limited land and water use modification within the project related catchment areas, the SQRs were considered largely natural to moderately modified at a desktop level (DWS, 2014).

The removal of natural vegetation surrounding drainage features is known to reduce the buffering capacity of the watercourses to impacts from adjacent land use activities, notably with a lowered resilience against erosion and water quality impacts. This in turn is likely to reduce aquatic fauna and flora populations and species compositions within the local area and potentially those downstream. Impacts would be expected directly within the tributary network through the physical loss of drainage features as well as damage to the remaining habitat.

The wetland units were largely indirectly associated with the project (outside of the 500 m regulated area) warranting no further ecological assessment of the wetland systems for this project, with emphasis rather afforded to the aquatic assessment of the rivers possibly at risk from the proposed project infrastructure. The aquatic features identified within the study area require a buffer of 50 m and are to be treated as a no-go zone and avoided as far as is feasible. Ensuring aquatic features and buffers are intact increases the resilience of a watercourse to future disturbances. These buffers would ensure adequate ecological integrity maintenance adjacent to the proposed infrastructure.

As a result of the ephemeral nature of the watercourses and susceptibility to erosion, the construction and operation phase activities would influence the hydrology, water quality and soil movement within the affected watercourses, notably where the proposed power line infrastructure and all alternatives traverse these aquatic features and their associated 50 m buffer. Provided the power line route is designed so that the pylons are located outside of no-go zones (where feasible), the project will present limited residual impacts to the watercourses.

Based on the survey findings, the specialist agrees with the "Very High" aquatic theme sensitivity as per the National Web based Environmental Screening Tool. The project infrastructure does pose a risk to the watercourses and it is the specialist's opinion that following the implementation of avoidance mitigation, recommendations and remedial measures, the risks can be lowered. Therefore, authorisation of the proposed development can be considered by the authorities provided that the recommended mitigation measures are implemented.

### 8.2.3 Impacts on Avifauna

The SABAP2 data indicates that a total of 162 species could potentially occur within the broader area where the project is located (see Appendix 1 of the Avifauna Impact Assessment). Of these, 76 are classified as priority species for solar developments. Of the 76 priority species, 45 have a medium to high probability of occurring regularly in the Project Site, and 21 of the priority species were recorded during the field monitoring. Five Red Data species were recorded during the site surveys, namely Cape Vulture (Globally and Regionally Endangered), Lanner Falcon (Regionally Vulnerable), Martial Eagle (Globally and Regionally Endangered), Secretarybird (Globally Endangered, Regionally Vulnerable), and Tawny Eagle (Globally Vulnerable, Regionally Endangered).

Pre-construction avifaunal surveys were carried out at the project site between the dates of 3–5 February 2022 (Survey 1) and 4–8 April 2022. (Survey 2). Surveys were conducted according to an adapted Regime 2 site as defined in the Solar Guidelines (Jenkins *et al.* 2017) i.e., a minimum of two surveys conducted over 6 months. 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 entire Project Site is a high sensitivity zone due to the potential presence of several SCC including African Rock Pipit, Black Stork, Blue Crane, Cape Vulture, Greater Flamingo, Karoo Korhaan, Lanner Falcon, Ludwig's Bustard, Martial Eagle, Secretarybird, Tawny Eagle, and Verreaux's Eagle which could utilise the whole Project Site for foraging. However, these species do not require specific avoidance measures at this stage because there is still adequate habitat available outside the Project Site.

At a site-specific level, environmentally sensitive features present within the proposed study area include the existing Jackal Buzzard nests. These areas are classified as areas of **HIGH** sensitivity. Construction in the areas containing Jackal Buzzard nests will need to be carefully managed to ensure minimal disturbance to the breeding birds and/or their progeny.

The following buffers are recommended:

» **All infrastructure exclusion zones:**

Jackal Buzzard nests: A 750m all infrastructure exclusion zone is recommended to prevent the displacement of the breeding pair during the construction phase due to disturbance. In addition, the buffer area will reduce the risk of injury to the juvenile bird due to collision with the solar panels, when it starts flying and practicing its hunting technique around the nest.

» **Solar panel exclusion zones (other infrastructure allowed):**

Riverine and wetland habitat: A 200m solar panel free buffer zone must be implemented around riverine areas, wetlands, and dams to provide unhindered access to the surface water for a variety of priority species. Surface water in this semi-arid habitat is crucially important for priority avifauna and many non-priority species. It is important to leave open space with no solar panels for birds to access and leave the surface water area unhindered. Surface water is also an important area for raptors to hunt birds which congregate around surface water, and they should have enough space for fast aerial pursuit. This will also benefit species like Blue Cranes which prefer to breed close to water bodies.

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 expected impacts of the Carolus EGI 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 would be reduced to LOW negative. No fatal flaws were discovered during 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 Hutton and Oakleaf, with other associated soils also occurring. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low to Moderate" sensitivities. The available climate can limit crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area. The area is not favourable for most cropping practices.

According to the National Web based Environmental Screening Tool, the proposed development is located within a "Medium" sensitivity land capability area. The protocols for minimum requirements (DEA, 2020) stipulates that in the event that a proposed development is located within "Low" or "Medium" sensitivities, an agricultural compliance statement will be sufficient. It is worth noting that according to these protocols, a site inspection will still need to be conducted to determine the accuracy of these sensitivities. After acquiring baseline information pertaining to soil resources within the 50 m regulated areas, it is the specialist's opinion that the soil forms and associated land capabilities concur with the sensitivities stated by the screening tool. Therefore, only an agricultural compliance statement was compiled.

During the construction phase, heavy vehicles (trucks) will be used to transport the components associated with the proposed power line and substation infrastructure to site. 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.

During the operation phase, limited impacts are foreseen. Maintenance of vegetation as well as the occasional maintenance of the power line 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.

Even though there might be negative impacts associated with the construction and operation phases of the EGI, the impacts are of low to medium significance. Low pre- and post-mitigation significance ratings are expected for the construction phase. During the operational phase, the pre-mitigation significance will be medium. If the recommended mitigation measures are to be followed during and after the construction and operation phases the overall impacts can be of acceptable ratings. It should be taken into account that the Karoo may take decades to rehabilitate, therefore rehabilitation may be challenging, highlighting



the need to avoid disturbance of these areas as far as possible. No significant impacts are identified for the decommissioning phase.

It is the specialist's opinion that based on the DAFF (2017) land capability sensitivity of the areas as confirmed through a site visit, the proposed project will have limited impact on the agricultural production ability of the land. Additionally, the proposed activities for the project will not result in the segregation of any high production agricultural land. Therefore, the proposed project may be favourably considered.

### **8.2.5 Impacts on Heritage Resources (Including Archaeology and Palaeontology)**

The results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Kruger, 2012). All of the archaeological resources identified within the area proposed for the Carolus EGI in this field assessment have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the proposed development in these locations from an archaeological perspective. The construction of power lines is not impactful on archaeological sites and the siting of pylons can be made through most of the area without causing significant damage to archaeological sites. The only significant site located in close proximity to the proposed grid alignment is site 014 which is described as "LSA and MSA site with mainly LSA hornfels flakes and pottery". This site has been graded IIIB and a no-development buffer of 100m is recommended around this site.

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and some do contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils. Almond (2010) found no fossils of significance during his site visit to Vetlaagte, and the Wag 'n Bietjie farm has the same lithology. It is unknown what lies below the surface. Based on previous surveys in the area, the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be low to moderate.

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 Carolus 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.

It is not anticipated that the proposed development of the EGI will negatively impact on significant heritage resources. There is no objection to the proposed development as described above in terms of impacts to heritage resources on condition that:

- » A 100m no-go development area must be implemented around site 014.
- » The attached Chance Fossil Finds Procedure is implemented for the duration of construction activities.

- » Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

### **8.2.6 Visual Impacts**

The findings of the Visual Impact Assessment undertaken for the proposed Carolus EGI indicates that the visual environment surrounding the power line, especially within a 0.5km radius (and potentially up to 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 following is a summary of impacts remaining, assuming mitigation as recommended is implemented:

- » During the construction phase, there may be an increase in heavy vehicles utilising the roads to the power line that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Construction activities may potentially result in a moderate temporary visual impact that may be mitigated to low.
- » The grid connection infrastructure is expected to have a moderate visual impact on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure. The visual impact of the power line will largely be absorbed by the presence of the existing power line infrastructure.
- » The grid connection infrastructure is expected to have a low negative visual impact on observers travelling along the roads and residents of homesteads within a 1.5 - 3km radius of the structures.
- » The potential visual impact of associated infrastructure is expected to have a moderate visual impact on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure pre mitigation and a low visual impact post mitigation.
- » Potential visual impact of lighting is expected to have a moderate visual impact on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure mitigated to low.
- » The anticipated visual impact of the proposed EGI on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of low negative significance. This is due to the relatively low viewer incidence within close proximity to the proposed grid connection infrastructure and the presence of existing powerlines.
- » The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of moderate negative significance, which is considered to be acceptable from a visual perspective. This is once again due to the relatively low viewer incidence within close proximity to the power line infrastructure.

The anticipated visual impacts listed above (i.e. post mitigation impacts) 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 the specialist's opinion that the development of the EGI as proposed be supported, subject to the implementation of the recommended mitigation measures and management programme.

### **8.2.7 Social Impacts**

Impacts are expected to occur with the development of the Carolus 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.

Negative impacts during construction include:

- » Impacts associated with the presence of construction workers on local communities.
- » Impact on local farmers and farming operations.
- » Noise, dust, and safety impacts of construction related activities and vehicles.
- » Increased risk of grass fires associated with construction related activities.
- » Noise, dust, and safety impacts associated with construction related activities and vehicles.
- » Impact on productive farmland.

Positive impacts during operation include:

- » Improved energy security and establishment of energy infrastructure.
- » Creation of employment, skills development, and business opportunities.
- » Generate income for landowners.

Negative impacts during operation include:

- » The visual impacts and associated impact on sense of place.
- » Loss of farm land and impact on farming operations.
- » Impact of maintenance activities on farming activities and operations.

The major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

Given the relatively small number of people employed during the operational phase (~ 20), the social impacts at a community level associated with decommissioning will be limited. In addition, potential impacts associated with the decommissioning phase can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

The findings of the SIA indicate that the development of the proposed Carolus EGI will create employment and business opportunities for locals in the ELM during both the construction and operational phase of the

project. All of the potential negative impacts, with the exception of the impact on sense of place, can also be effectively mitigated.

The significance of this impact is rated as **Low Negative with mitigation**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The establishment of proposed EGI for the Pixley Park PV SEF Cluster 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 Carolus 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 Carolus 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.

All cumulative impacts associated with the Carolus EGI will be of a low to medium/moderate significance. A summary of the cumulative impacts is included in **Table 8.1** below.

**Table 8.1:** Summary of the cumulative impact significance for the Carolus 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	Medium
Land use, soil and agricultural potential	Low	Medium
Heritage (including archaeology, palaeontology and sense of place)	Low	Low
Visual	Moderate	Moderate
Social	Low	Medium

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

### 8.3. Environmental Sensitivities

As part of the specialist studies undertaken within the development footprint of the 132kV substation and 200 m wide 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:
  - \* The loss of habitat and emigration of fauna (High – Very High Sensitivity)
  - \* It is recognised as an Ecological Support Area as per the Northern Cape Critical Biodiversity Areas spatial database
  - \* The Combined Terrestrial Biodiversity Theme Sensitivity was rated as 'Very High' according to the Environmental Screening Tool;
  - \* The Ecosystem Protection Level for the vegetation type associated with the development footprint is regarded as Not Protected; and
  - \* It is regarded as an Upstream Management Area according to the NFEPA database.
- » **Aquatic Ecology:** The study indicates that the indirectly affected downstream Brak River system and directly associated ephemeral tributaries within the project area have sensitivity to modification and are considered to be of high sensitivity and a **50m no-go buffer** has been recommended around these features.
- » **Avifauna:** At a site-specific level, the entire Project Site is a high sensitivity zone due to the potential presence of several SCC including African Rock Pipit, Black Stork, Blue Crane, Cape Vulture, Greater Flamingo, Karoo Korhaan, Lanner Falcon, Ludwig's Bustard, Martial Eagle, Secretary bird, Tawny Eagle, and Verreaux's Eagle which could utilise the whole Project Site for foraging. However, these species do not require specific avoidance measures at this stage because there is still adequate habitat available outside the Project Site. A **750m all infrastructure exclusion zone** is recommended to prevent the displacement of the breeding pair during the construction phase due to disturbance. In addition, the buffer area will reduce the risk of injury to the juvenile bird due to collision with the solar panels, when it starts flying and practicing its hunting technique around the nest. A **200m solar panel free buffer zone** must be implemented around riverine areas, wetlands, and dams to provide unhindered access to the surface water for a variety of priority species. Surface water in this semi-arid habitat is crucially important for priority avifauna and many non-priority species. It is important to leave open space with no solar panels for birds to access and leave the surface water area unhindered. Surface water is also an important area for raptors to hunt birds which congregate around surface water, and they should have enough space for fast aerial pursuit. This will also benefit species like Blue Cranes which prefer to breed close to water bodies.
- » **Heritage:** The overall archaeological sensitivity of the development area with regard to the preservation of Early, Middle and Later Stone Age archaeology as well as Khoi and San heritage, early colonial settlement is regarded as very high. Despite this, the field assessment conducted for this project has demonstrated that the specific area proposed for development has low sensitivity for impacts to significant archaeological heritage. 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. Thus, the construction of powerlines is not impactful on archaeological sites and the siting of pylons can be made through most of the area without causing significant damage to archaeological site. The only significant site located in close proximity to the proposed grid alignment is site 014 which is described as "LSA and MSA site with mainly LSA hornfels flakes and pottery". This site has been graded IIIB and a no-development **buffer of 100m** is recommended around this site.

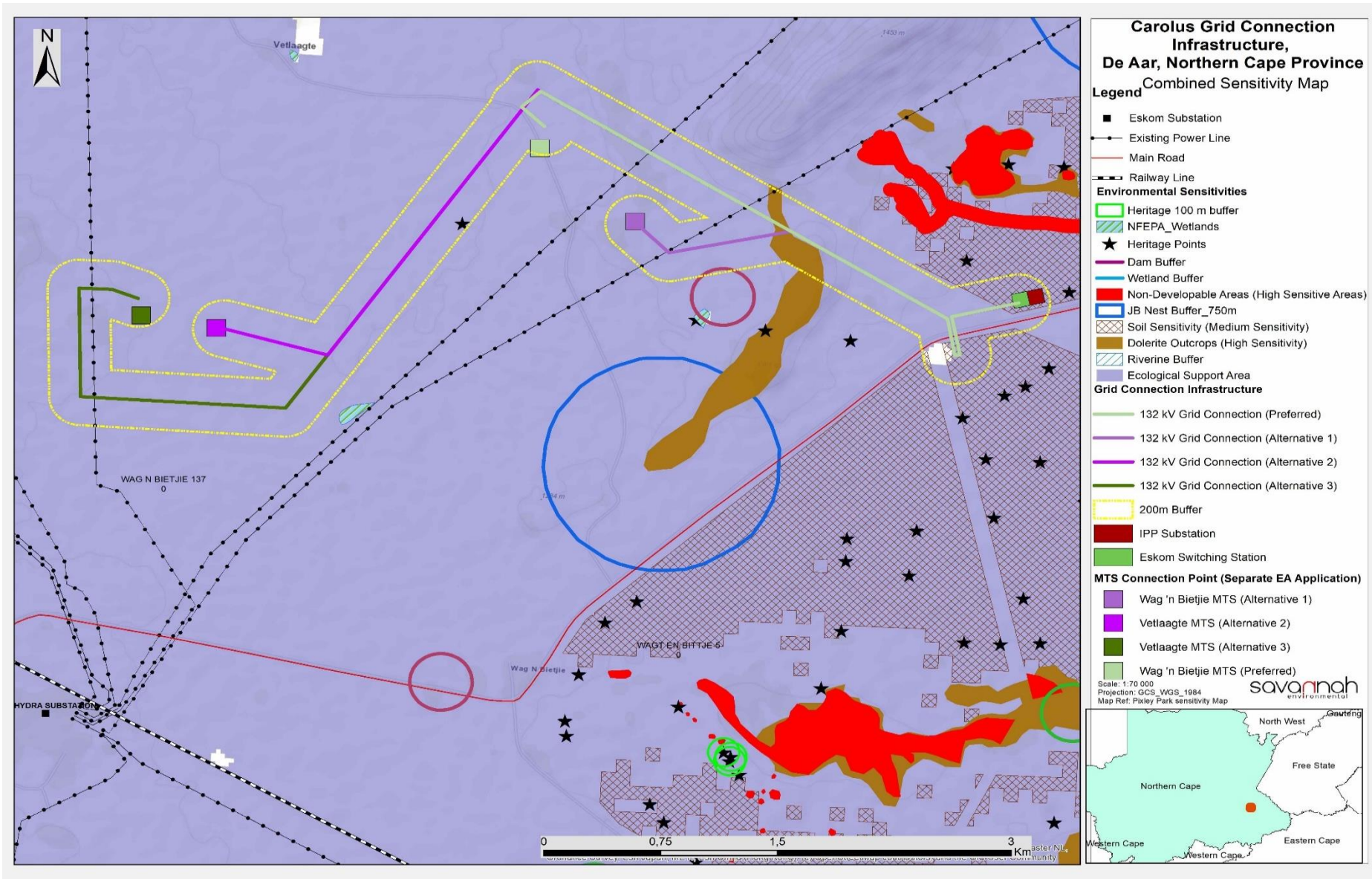


Figure 8.1: Environmental sensitivity and layout map of the Carolus EGI

#### 8.4. Environmental Costs of the Carolus 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 EMPs, 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. It will be possible to reduce impacts on these areas through appropriate micro-siting of infrastructure during the final design phase.
- » *Impacts on aquatic resources* – Drainage lines and a river which are both considered to be of high sensitivity are traversed by the grid corridor and may be impacted (either directly or indirectly) by the proposed EGI. It will be possible to reduce impacts on these areas through appropriate micro-siting of infrastructure during the final design phase.
- » *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 study area. Impacts can be minimised through the implementation of mitigation measures as recommended by the specialist. No impacts of high significance were identified and no fatal flaws were indicated.
- » *Visual impacts associated with the Carolus 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 EGI. 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. Within the study area there are numerous existing power lines that all congregate at the Hydra Substation. The visual amenity along this infrastructure corridor has therefore already been compromised to a large degree.
- » *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 are considered to be conservation worth or of significance from a heritage perspective.

Benefits of the establishment of the Carolus EGI include the following:

- » The project will connect the Carolus Solar PV1 Facility to the national grid, thereby facilitating the transmission of 120MW of renewable energy into the national grid. South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. The greater Pixley Park (four PV solar plants and associated grid connection solution) will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa. Without the grid connection infrastructure, this will not be possible.
- » The project will contribute towards the Provincial and Local IDP objectives for the provision of electricity through the provision of essential infrastructure for the Carolus Solar PV1 Facility (in process for environmental authorisation, DFFE Ref.: 14/12/16/3/3/2/2154).
- » 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 benefits of the Carolus EGI are expected to occur at a national, regional and local level. If the costs to the environment are limited through the appropriate placement of infrastructure within the assessed corridor and footprint as recommended, 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 substation and a 300 m wide power line corridor were proposed by the developer and assessed as part of the BA process. The assessment of the substation development footprint as well as the 300 m wide 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 substation and power line within the assessed corridor. The final placement of the substation and power line servitude within the assessed corridor must be undertaken in response to the identified sensitive environmental features and areas in order to maximise avoidance of these areas and minimise impacts.

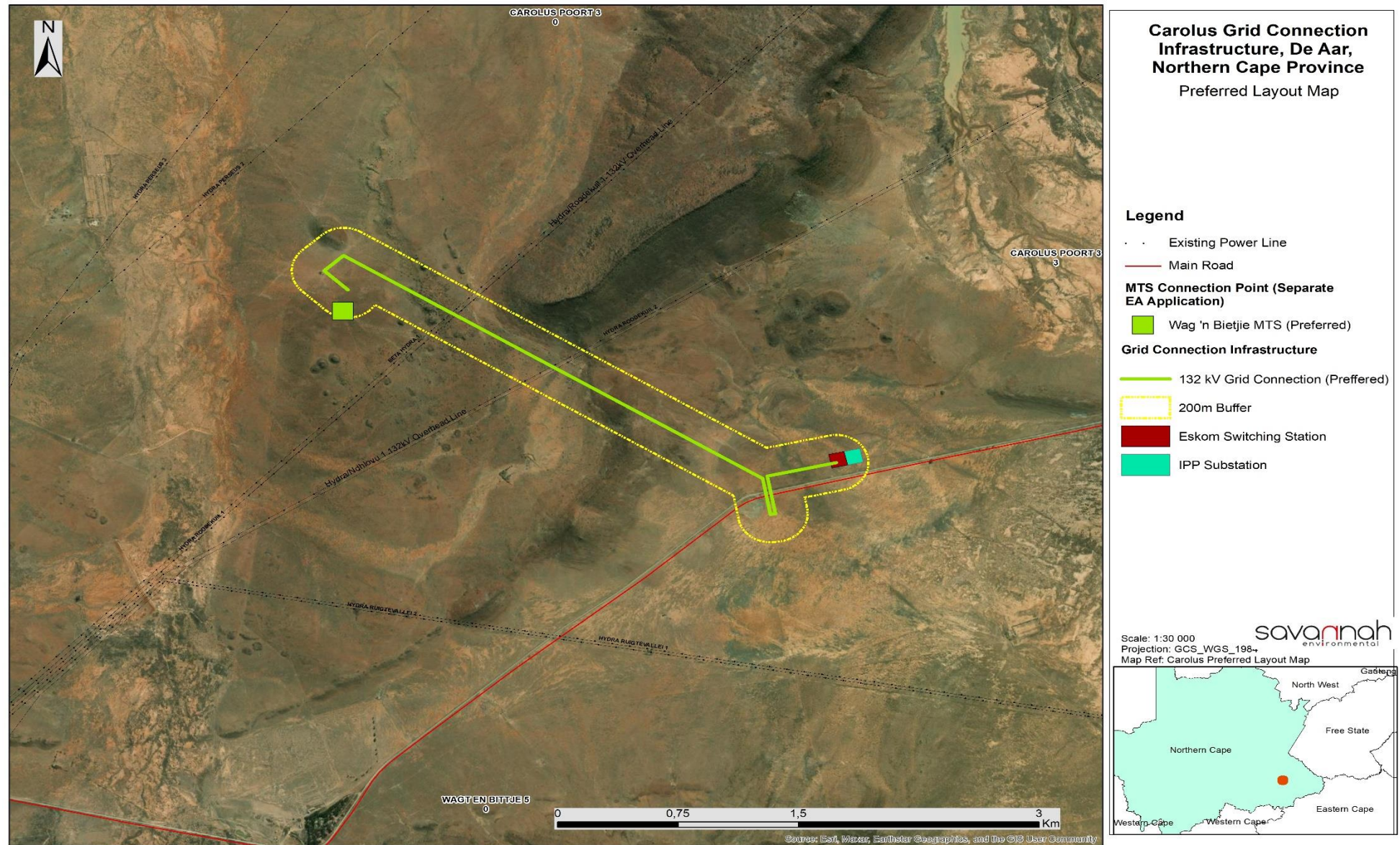
From the specialist studies undertaken, it can be concluded that impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. This is however not relevant for the visual impact of the infrastructure as the substation and power 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 substation development footprint and power line corridor within the project site, it can be concluded that the development of the Carolus 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 substation the power line and associated access road within the identified corridor that is between 4.3 km (to Wagt 'n Bietjie MTS) and 7.8 km (to Vetlaagte MTS) long, 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 Carolus EGI is acceptable within the landscape and can be reasonably authorised. It is the opinion of the EAP that the preferred route alignment of 4.3km (to Wagt 'n Bietjie MTS) grid connection can thus be approved (Figure 8.2).





**Figure 8.2:** Final preferred layout for the Carolus EGI considered to be acceptable for development

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

- » Onsite 132kV Eskom switching station - 100m x 100m and 30m height, metering, relay & control buildings, laydown area, ablutions with conservancy tanks and water storage tanks, and access roads which is handed back to Eskom.
- » 132kV Overhead Power Line (OHPL) – 30m height from the switching station to the Main Transmission Substation (MTS) located on Vetlaagte (RE/4) and Wag en Bittje (RE/5) farms which will be handed back to Eskom (within 300m wide corridor and a 31m wide servitude).
- » Access roads to substation sites (up to 12 m wide) and service tracks (up to 6 m wide) where no existing roads are available.

The following key conditions would be required to be included within the environmental authorisation issued for the Carolus 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 EMPs as contained within **Appendix K and L** of this BA Report should form part of the contract with the Contractor appointed to construct and maintain the substation and power lines in order to ensure compliance with environmental specifications and management measures. The implementation of these EMPs for all life cycle phases of the substation and power line is considered key in achieving the appropriate environmental management standards as detailed for this project.
- » Following the final design of the EGI, a final substation layout and power line 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 commences and the layout and corridor should be adjusted, where required, to reduce impacts on species of conservation concern, habitats of concern, watercourses 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

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104576	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Solar PV Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104804	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED RENOSTERBERG SOLAR PV AND WIND ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE PROVINCE
133138	HIA Phase 1	Jayson Orton, Lita Webley	09/07/2013	HERITAGE IMPACT ASSESSMENT FOR MULTIPLE PROPOSED SOLAR ENERGY FACILITIES
133536	Palaeontological Specialist Reports	John E Almond	01/07/2013	PALAEONTOLOGICAL SPECIALIST STUDY
133536	Palaeontological Specialist Reports	John E Almond	01/07/2013	PALAEONTOLOGICAL SPECIALIST STUDY
163982	Palaeontological Specialist Reports		31/08/2013	Palaeontological specialist assessment: combined desktop and field study: Proposed development PV Solar Facility near De Aar, Northern CApe Province
163994		Wouter Fourie	03/08/2013	Proposed PV Facility: Heritage Impact Report
177599	AIA Phase 1	Jonathan Kaplan	01/04/2010	ARCHAEOLOGICAL IMPACT ASSESSMENT PROPOSED PHOTOVOLTAIC POWER GENERATION FACILITY IN DE AAR NORTHERN CAPE
177600	Site Inspection Report	Will Archer, Jonathan Kaplan	01/05/2012	Reconnaissance and plan for further mitigation: sites impacted on by proposed photovoltaic power generation facility in De Aar Northern Cape
256408	Palaeontological Specialist Reports	John E Almond	16/07/2013	Palaeontological Specialist Study: Combined Desktop and Field-based Assessments - Proposed Photovoltaic (Solar) Energy Facilities on Badenhorst Dam Farm near De Aar, Northern Cape
256413	Heritage Impact	Jayson Orton	09/07/2013	Heritage Impact Assessment for Multiple Proposed Solar Energy Facilities on De Aar 180/1 (Badenhorst Dam Farm), De

NID	Author(s)	Date	Type	Title
	Assessment Specialist Reports			Aar, Northern Cape
339820	Heritage Impact Assessment Specialist Reports	Lita Webley, Jayson Orton	01/12/2011	Proposed De Aar Wind Energy Facility on the North and South Plateau, Northern Cape Province
339824	Heritage Impact Assessment Specialist Reports	Lita Webley, David Halkett	01/06/2015	Addendum: Proposed Wind Energy Facility situated on the Eastern plateau (South) near De Aar, Northern Cape Province.
4052	HIA Phase 1	Albert van Jaarsveld	01/03/2006	Hydra-Perseus and Beta-Perseus 765 kV Transmission Power Lines Environmental Impact Assessment. Impact on Cultural Heritage Resources
49745	AIA Phase 1	Neels Kruger	01/03/2012	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE AREAS ON THE OF THE FARM VETLAAGTE 4, DE AAR, NORTHERN CAPE PROVINCE
49843	PIA Phase 1	John E Almond	01/05/2012	PALAEONTOLOGICAL SPECIALIST STUDY: COMBINED DESKTOP AND FIELD-BASED ASSESSMENTS Proposed solar power generation facilities on the remaining extent of the farm Vetlaagte No. 4, De Aar, Northern Cape Province
50006	HIA Phase 1	Jayson Orton	20/02/2012	HERITAGE IMPACT ASSESSMENT FOR THREE SOLAR ENERGY FACILITIES AT DE AAR, WESTERN CAPE
53198	HIA Phase 1	Elize Becker	20/04/2012	Phase 2 Heritage Impact Assessment De Aar Solar One Photovoltaic Power Project Heritage Impact Assessment Phase 2
53200	Heritage Scoping	Elize Becker	18/01/2012	HERITAGE IMPACT ASSESSMENT SCOPING REPORT Prepared for De Aar Solar One Photovoltaic Power Plant, Northern Cape
58989	PIA Desktop	James Brink	10/08/2012	A Palaeontological Desktop Study of the Area to be Affected by the Proposed Photovoltaic Power Project on Portion 3 of Farm Hartebeestplaats 135
8378	HIA Phase 1	Jayson Orton	29/02/2012	HIA for three solar energy facilities at the De Aar, Northern Cape (Paarde Valley, Badenhorst Dam Farm and Annex Du Plessis Dam Farm)
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