

## Report

**Basic Assessment for the Development of a 400kV Loop-In-Loop-Out (LILO) Powerline to the Existing Eskom Garona Substation and Expansion/Upgrade of the Eskom Garona Substation on Portions 4; 5; 9 and the Remaining Extent of the Farm Bokpoort 390, Groblershoop, !Kheis Local Municipality (Ref 14/12/16/3/3/1/2371)**

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Reference: MD4195-RHD-ZZ-XX-R-YE-001  
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Classification

Project related

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## Executive Summary

### **Background**

In September 2020, the Department of Mineral Resources and Energy (DMRE) released a request for proposal as part of the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP) to reduce the current load shedding periods being experienced by the country. In responding to the request, the ACWA Power-led consortium submitted a bid for 150MWe Photovoltaic (PV) plant under the name “Project DAO” and were successful.

Project DAO received a Cost Estimate Letter (CEL) from Eskom Holdings SOC Ltd (hereafter referred to as Eskom) as part of its solution towards the connection of the project to the National grid. The CEL indicated that additional strengthening of the Garona Substation will be required in order to fully handle the capacity which would have been generated by the project. This further aligns to Eskom’s planned multiple-grid strengthening projects across the country and due to the timelines, Eskom, are not able to undertake the project. As such, ACWA Power Project DAO (RF) Pty Ltd will be undertaking the additional work as part of the self-build agreement between the two entities after which the infrastructure will be handed over to Eskom for operations and maintenance.

The project consists of the following components:

- Loop-in to the existing Ferrum-Garona 400kV powerline to the Eskom Garona Substation;
- Loop-out into the existing Garona-Nieuwehoop 400kV powerline from the Eskom Garona Substation; and
- Upgrade and expansion of the Eskom Garona Substation to accommodate the additional electricity generated, which includes the following:
  - Establish a 400kV busbar at Garona Substation.
  - Establish and equip 2 x 400kV feeder bays.
  - Extend the 132kV busbar at Garona Substation (to accommodate the 400/ 132kV transformer).
  - Install a 500MVA 400/ 132kV transformer with associated transformer bays.
  - Provide space for 1 future 400/ 132kV transformer.
  - Equip and commission the 1x 132kV feeder bay.

Two alternatives have been proposed for the project Option 1 involves the establishment of the new 400kV powerline that will loop-in at the existing 400kV Ferrum-Garona powerline and loop-out of the existing 400kV Garona-Nieuwehoop powerline. This has been catered for in the Eskom Transmission Development Plan 2019-2028 as well as the plans for the expansion of the Eskom Garona Substation which has been planned to take into the consideration the increased input of electricity produced from the Independent Power Producer (IPP), which Eskom has committed capital to integrate the successful bidders from the Renewable Energy Independent Power Producer Procurement Program (REIPPPP) into the National grid.

Option 2 will only require the project to build a substation on the project site with a 400kV loop-in-loop-out powerline toward the Ferum-Nieuwehoop powerline (which runs adjacent to the project site). It will not require any pylons/ towers to be constructed in any unauthorised areas. The exact same scope will be facilitated within the project site boundary as Option 1.

### **Process**

This Basic Assessment (BA) follows the legislative process prescribed in the Environmental Impact Assessment (EIA) Regulations 2014 (as amended). This report constitutes the final Basic Assessment Report (BAR) which details the environmental outcomes, impacts and residual risks of the proposed

activities. The report aims to assess the key environmental issues and impacts associated with the development, and to document Interested and Affected Parties' (I&APs) issues and concerns. Furthermore, it provides background information of the proposed project, a motivation and details of the proposed project, and describes the public participation undertaken to date.

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant environmental legislation that were taken into consideration during this study and are elaborated on in this report.

The Department of Forestry, Fisheries and the Environment (DFFE) is the lead/ Competent Authority for this BA study and the project needs to be authorised by this Department.

### **Key Findings**

#### **Soils and Agricultural Potential**

No agricultural sensitive areas occur within the proposed site and no part of it is therefore required to be set aside for agriculture. Because of the low agricultural potential of the site, and the consequent low agricultural impact, there are no restrictions relating to agriculture which would preclude authorisation of the proposed development.

#### **Water Resources**

Spillage of fuels, lubricants and other chemicals must be cleaned up immediately and disposed of at an appropriately licenced landfill site. Mitigation for spillage or leakages must include bunded areas to store chemicals and/ or fuel.

#### **Ecology**

A review of the biodiversity on site and the anticipated impacts associated with this type of development on the biodiversity indicates that none of the anticipated impacts can be highlighted or construed to represent an unacceptable or severe threat to sensitive biodiversity within the development footprint. This development does however form part of a larger development and the cumulative impacts associated with every phase of this development does have a significant impact to the biodiversity in the greater area.

There will be a substantial loss of SCC as a result of the Project DAO PV development in its entirety, most notably the number of *Boscia albitrunca* trees that will be lost. Although the expansion of the Garona Substation will result in an insignificant number of SCC being lost as a direct result of the development the cumulative impact of the loss of protected trees as a result of the whole solar development should be considered. Although *B. albitrunca* is not considered to be in decline and is therefore listed as Least Concern it is listed as a protected species because it is considered a keystone species in the arid parts of South Africa, where it not only provides browse, but shade and microhabitat for other biota (i.e. a close-knit relationship exists between *Boscia albitrunca* and the Brown-veined White butterfly (*Belenois aurota*)).

This proposed expansion falls with the Kalahari Karroid Shrubland vegetation type, which is a considerably small vegetation type for the arid region (828 389.89ha) with only 0.1% under formal protection in the Augrabies Falls Nature Reserve. The Bokpoort Solar developments will destroy about ~0.17% of the conservation target, this is approximately what is currently under formal protection. Even though it has a conservation target of 21%, no conservation land has been added to this vegetation unit since 2006. There is a concern that increased impacts on this vegetation unit can result in fragmented islands which can ultimately result in the hindering of ecosystem functions and processes.

A biodiversity offset has therefore been mandated for the Project DAO PV development, to ensure that all residual impacts associated with the development as a whole are adequately compensated, the offset area calculation has included all aspects/ phases of the project including the expansion of the Garona Substation. A Biodiversity Offset Feasibility Investigation has been conducted and the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NCDAERL) have made recommendations.

### **Avifauna**

- Expansion of the existing Garona Substation:

The area immediately surrounding the existing Garona Substation that would be the focus of the proposed expansion already experiences high levels of existing disturbance. Therefore, any direct habitat loss associated with expansion of the substation would not have a significant negative impact on avifauna in the area, particularly regarding priority species as they have likely already been displaced from the area. Priority species are similarly unlikely to enter the substation yard and therefore impacts associated with collisions or electrocutions caused by electrical infrastructure are unlikely to be significant. The proposal for the expansion of the existing Garona Substation to facilitate the grid connection can therefore be approved from an avifaunal perspective.

- Loop-in-loop-out Route

The position of the proposed LILO overhead powerline infrastructure to loop-in to the existing Ferrum-Garona 400kV powerline and loop-out from the existing Garona–Nieuwehoop 400kV powerline is between a road, railway line and the operational Bokpoort Solar Facility and runs in close proximity to- or adjacent to existing overhead powerline infrastructure. This position combined with the high levels of existing disturbance on the site make it unlikely that the proposed LILO grid connection route will significantly contribute to an increased cumulative negative impact on local avifauna, particularly with regards to priority species as they are unlikely to be present. Additionally, overhead powerlines and towers have the potential to reduce the existing risks to avifauna (such as powerline collisions) by increasing the visibility of the lines to avifauna if suitable line-marking devices (such as BFDs) are used and if new pylons can be positioned in a staggered manner relative to the existing pylons.

### **Air Quality**

The key pollutant from the proposed site during the construction and decommissioning phases would be Particulate Matter (PM). Various PM control measures for the construction phase are presented, the key being wet suppression.

### **Heritage and Palaeontology**

Stone Age lithics dating to the Middle Stone Age (MSA) are found only as low-density surface scatters. The low density of the lithic scatters is, on archaeological grounds, viewed to be of low significance and require no further action. No sites, features or objects of cultural significance are known to exist in the development area, and there would be no impact as a result of the proposed development. Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

No significant impacts on fossil heritage are anticipated during the construction, operational and closure phases of the project. The proposed 400kV LILO powerline and expansion and upgrade of the Garona Substation is expected to have a neutral effect from a palaeontological heritage impact perspective i.e. no advantages or disadvantages are expected.

There are no objections on palaeontological heritage grounds to approval of the proposed development, subject to the conditions and recommendations as stipulated in the original Environmental Authorisation,

and according to the Environmental Management Programmes (EMPrs) and suggested mitigation measures, as outlined in the original Palaeontological Heritage Assessment Report.

#### **Traffic**

The traffic impacts associated with the ten 132kV powerlines as well as the substation presented in Option 2 has been previously assessed and authorised as part of the PV development, the 400kV LILLO powerline will replace these 132kV powerlines therefore no additional traffic impacts are envisaged.

#### **Visual**

The visual impact from the 400kV LILLO powerline and the expansion and upgrade of the Garona Substation will be cumulative to the existing visual transformation of anthropological origin (Bokpoort I installation, farm buildings, powerlines, railway line, roads) and will be present for the operational life of the facility (estimated at 30 years). The impact will be totally reversible upon decommissioning and closure of the solar facility.

#### **Socio-economic**

The proposed project will have a positive impact as it will provide further support to the National grid therefore aiding in provide electricity security to the region and the country. The potential job creation at the construction phase of the project will be a positive for the local and regional economy as unemployment in the country is increasing. An assured and diversified electricity generation mix is a key step in attracting investors into South Africa and is key for the growth and development.

#### **Environmental Impact Statement**

The project, in the EAP's opinion, does not pose a detrimental impact on the receiving environment and its inhabitants and potential impacts can be mitigated significantly. The substation expansion as well as new 400kV powerline construction will take place within an environment that was already impacted on by existing infrastructure construction. There are no fatal flaws prohibiting the project from going ahead.

#### **Cumulative Impact Statement**

The proposed 400kV LILLO powerline route is relatively short and runs in close proximity to existing and authorised infrastructure. In the immediate vicinity, the proposed powerline route runs near or adjacent to the operational Bokpoort CSP Solar Facility, existing powerline infrastructure, the existing Sishen-Saldanha railway, an existing road and the authorised and approved Project DAO Solar PV Plant. This position combined with the high levels of existing disturbance on the site make it unlikely that the proposed LILLO grid connection route will significantly contribute to an increased cumulative negative impact.

In addition, the proposed project will be developed within a REDZ (REDZ 7) which is earmarked for large scale solar energy facilities and is within the Northern Corridor Strategic Transmission Corridor. Further to this, the development is preferable, from an impact point of view as well as from practical considerations, to rather have a concentrated node of renewable energy development within one area, than to spread out the same number of developments over a larger area.

#### **Recommendations**

Option 1 is the most feasible due to risk and safety factors as two 400kV substations may not be constructed in close proximity to each other as the Garona Substation and the proposed new Project DAO Substation are located within a distance of 1.6km to each other. In addition to this, Eskom has planned for the expansion and upgrade of the Garona Substation which will accommodate all future growth in terms of the electricity generated by the successful bidders within this area.

**Note: Changes from the draft to the final BAR are underlined for ease of reference.**

## Acronyms

ACAS	Avian Collision Avoidance System
BA	Basic Assessment
BAR	Basic Assessment Report
BFD	Bird Flight Diverter
BID	Background Information Document
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CEL	Cost Estimate Letter
CSP	Concentrating Solar Power
CV	Curriculum Vitae
DDT	Data Deficient - Taxonomically Problematic
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
DMRE	Department of Mineral Resources and Energy
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
E-MF	Electro-Magnetic Field
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
EWT	Endangered Wildlife Trust
GIIP	Good International Industry Practices
GNR	Government Notice Regulation
GVA	Gross Value Added
GWC	Griqualand West Centre of Endemism
I&AP	Interested and Affected Party
IFC	International Finance Corporation
IDP	Integrated Development Plan
IPP	Independent Power Producer
IRP	Integrated Resources Plan
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature
LC	Least Concern
LILO	Loop-In-Loop-Out
LOS	Level of Service
MEA	Mean Annual Evaporation
NCCAS	National Climate Change Adaptation Strategy
NCDAERL	Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
NCNCA	Northern Cape Nature Conservation Act
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMBA	National Environmental Management Biodiversity Act (Act No. 10 of 2004)
NEM:PAA	National Environmental Management Protected Areas Act (Act No. 57 of 2003)

NEM:WA	National Environmental Management – Waste Act (Act No. 59 of 2008)
NFA	National Forests Act (Act No. 84 of 1998)
NGO	Non-Governmental Organisation
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
OHSA	Occupational Health and Safety Act (Act No 85 of 1993)
PICC	Presidential Infrastructure Coordinating Committee
PM	Particulate Matter
PP	Public Participation
PS	Performance Standards
PSDF	Provincial Spatial Development Framework
PV	Photovoltaic
REDZ	Renewable Energy Development Zone
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RFP	Request for Proposal
SABAP	South African Bird Atlas Project
SACNASP	South African Council of Natural Science Professionals
SAHRA	South African Heritage Resource Agency
SANBI	South African National Biodiversity Institute
SARCA	Southern African Reptile Conservation Assessment
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SDG	Sustainable Development Goals
SEF	Solar Energy Facility
SIP	Strategic Infrastructure Program
SWMP	Stormwater Management Plan
TOPS	Threatened or Protected Species
UNFCCC	United Nations Framework Convention on Climate Change
WRF	Weather Research and Forecasting
WUA	Water Use Authorisation

## Symbols

MW	Megawatt
NO <sub>x</sub>	Oxides of nitrogen



## Glossary

<b>Activity (Development)</b>	An action either planned or existing that may result in environmental impacts through pollution or resource use. For the purpose of this report, the terms 'activity' and 'development' are freely interchanged.
<b>Alternatives</b>	Different means of meeting the general purpose and requirements of the activity, which may include site or location alternatives; alternatives to the type of activity being undertaken; the design or layout of the activity; the technology to be used in the activity and the operational aspects of the activity.
<b>Applicant</b>	The project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.
<b>Biodiversity</b>	The diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.
<b>Buffer</b>	A buffer is seen as an area that protects adjacent communities from unfavourable conditions. A buffer is usually an artificially imposed zone included in a management plan.
<b>Construction</b>	The building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.
<b>Cumulative Impact</b>	The impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
<b>Decommissioning</b>	The demolition of a building, facility, structure or infrastructure.
<b>Direct Impact</b>	Impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.
<b>Ecosystem</b>	A dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.
<b>Environment</b>	In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), "Environment" means the surroundings within which humans exist and that are made up of: <ul style="list-style-type: none"> <li>i. the land, water and atmosphere of the earth;</li> <li>ii. micro-organisms, plants and animal life;</li> <li>iii. any part or combination of (i) and (ii), and the interrelationships among and between them; and</li> <li>iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.</li> </ul>
<b>Environmental Assessment</b>	The generic term for all forms of environmental assessment for projects, plans, programmes or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.
<b>Environmental Authorisation</b>	An authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

<b>Environmental Assessment Practitioner (EAP)</b>	The individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.
<b>Environmental Control Officer (ECO)</b>	An individual nominated through the Client to be present on site to act on behalf of the Client in matters concerning the implementation and day to day monitoring of the EMPr and conditions stipulated by the authorities.
<b>Environmental Impact</b>	Change to the environment (biophysical, social and/ or economic), whether adverse or beneficial, wholly or partially, resulting from an organisation's activities, products or services.
<b>Environmental Management</b>	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.
<b>Environmental Management Programme (EMPr)</b>	A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project.
<b>Fatal Flaw</b>	An event or condition that could cause an unanticipated problem and/or conflict which could result in a development being rejected or stopped.
<b>Groundwater</b>	Water in the ground that is in the zone of saturation from which wells, springs, and groundwater runoff are supplied.
<b>Hazardous Waste</b>	Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles as outlined in the National Environmental Management: Waste Amendment Act (Act No. 26 of 2014).Schedule 3: Category A – Hazardous Waste.
<b>Hydrology</b>	The science encompassing the behaviour of water as it occurs in the atmosphere, on the surface of the ground, and underground.
<b>Indirect Impacts</b>	Indirect or induced changes that may occur as a result of the activity. These types if impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity
<b>Integrated Environmental Management (IEM)</b>	A philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity - at local, national and international level – that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).
<b>Interested and Affected Party (I&amp;AP)</b>	Any person, group of persons or organisation interested in or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.
<b>Method Statement</b>	A method statement is a written submission by the Contractor to the Engineer in response to the specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting

	<p>a Method Statement. It contains sufficient detail to enable the Engineer to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.</p>
<b>Mitigate</b>	The implementation of practical measures designed to avoid, reduce or remedy adverse impacts or enhance beneficial impacts of an action.
<b>No-Go Option</b>	In this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.
<b>Pollution</b>	The National Environmental Management Act, No. 107 of 1998 defines pollution to mean any change in the environment caused by – substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
<b>Public Participation Process</b>	A process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.
<b>Re-use</b>	To utilise articles from the waste stream again for a similar or a different purpose without changing the form of properties of the articles.
<b>Rehabilitation</b>	A measure aimed at reinstating an ecosystem to its original function and state (or as close as possible to its original function and state) following activities that have disrupted those functions.
<b>Sensitive Environments Significance</b>	Any environment identified as being sensitive to the impacts of the development.  Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. magnitude, intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e. biophysical, social and economic).
<b>Stakeholder Engagement</b>	The process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities.
<b>Sustainable Development Watercourse</b>	Development which meets the needs of current generations without hindering future generations from meeting their own needs. Defined as: <ul style="list-style-type: none"> <li>i. a river or spring;</li> <li>ii. a natural channel or depression in which water flows regularly or intermittently;</li> <li>iii. a wetland, lake or dam into which, or from which, water flows; and</li> <li>iv. any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.</li> </ul>
<b>Water Pollution</b>	The National Water Act, 36 of 1998 defined water pollution to be the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it – less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful (aa) to the welfare, health or safety of human beings; (bb) to any aquatic or non-aquatic organisms; (cc) to the resource quality; or (dd) to property”.

**Wetland**

Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

## 1 INTRODUCTION

In September 2020, the Department of Mineral Resources and Energy (DMRE) released a request for proposal as part of the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP) to reduce the current load shedding periods being experienced by the country. In responding to the request, the ACWA Power-led consortium submitted a bid for 150MWe Photovoltaic (PV) plant under the name “Project DAO” and were successful.

Project DAO received a Cost Estimate Letter (CEL) from Eskom Holdings SOC Ltd (hereafter referred to as Eskom) as part of its solution towards the connection of the project to the National grid. The CEL indicated that additional strengthening of the Garona Substation will be required in order to fully handle the capacity which would have been generated by the project. This further aligns to Eskom’s planned multiple-grid strengthening projects across the country and due to the timelines, Eskom, are not able to undertake the project. As such, ACWA Power Project DAO (RF) Pty Ltd will be undertaking the additional work as part of the self-build agreement between the two entities after which the infrastructure will be handed over to Eskom for operations and maintenance.

The project consists of the following components:

- Loop-in to the existing Ferrum-Garona 400kV powerline to the Eskom Garona Substation;
- Loop-out into the existing Garona-Nieuwehoop 400kV powerline from the Eskom Garona Substation; and
- Upgrade and expansion of the Eskom Garona Substation to accommodate the additional electricity generated, which includes the following:
  - Establish a 400kV busbar at Garona Substation.
  - Establish and equip 2 x 400kV feeder bays.
  - Extend the 132kV busbar at Garona Substation (to accommodate the 400/ 132kV transformer).
  - Install a 500MVA 400/ 132kV transformer with associated transformer bays.
  - Provide space for 1 future 400/ 132kV transformer.
  - Equip and commission the 1x 132kV feeder bay.

The locality map including the layout is provided in Figure 1-1 and **Appendix A**.

### 1.1 Previous EIA Studies

This Basic Assessment (BA) study relies on the previous Environmental Impact Assessment (EIA) studies including specialist assessments listed below:

- Proposed 75MW Photovoltaic (PV 1) Solar Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape undertaken by Golder Associates Africa, 2016<sup>1</sup>.
- Proposed 75MW Photovoltaic (PV 2) Solar Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape undertaken by Golder Associates Africa, 2016<sup>2</sup>.
- Proposed 125MW Ndebele Photovoltaic Plant Development and Associated Battery Energy Storage System on the Remaining Extent of the Farm Bokpoort 390, Northern Cape undertaken by Royal HaskoningDHV, 2020<sup>3</sup>.

<sup>1</sup> Schlechter, M., & Baxter, B. 2016. *Final EIA Report: Proposed 75MW Photovoltaic (PV1) Solar Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape*. Golder Associates. Ref 14/12/16/3/3/2/881.

<sup>2</sup> Schlechter, M., & Baxter, B. 2016. *Final EIA Report: Proposed 75MW Photovoltaic (PV2) Solar Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape*. Golder Associates. Ref 14/12/16/3/3/2/880.

<sup>3</sup> Reddy, P., & Govender, S. 2020. *Final Basic Assessment Report: Proposed 125MW Ndebele Photovoltaic Plant Development and Associated Battery Energy Storage System on the Remaining Extent of the Farm Bokpoort 390, Northern Cape undertaken by Royal HaskoningDHV*. Ref 14/12/16/3/3/2/149.

- Proposed Development of 200MW Venda Photovoltaic Plant and Battery Energy Storage System near Groblershoop within the !Kheis Local Municipality, Northern Cape undertaken by Royal HaskoningDHV, 2020<sup>4</sup>.
- Proposed Development of 200MW Sotho Photovoltaic Plant and Battery Energy Storage System near Groblershoop within the !Kheis Local Municipality, Northern Cape undertaken by Royal HaskoningDHV, 2020<sup>5</sup>.
- Proposed Development of 200MW Afrikaans Photovoltaic Plant and Battery Energy Storage System near Groblershoop within the !Kheis Local Municipality, Northern Cape undertaken by Royal HaskoningDHV, 2020<sup>6</sup>.
- Proposed Development of 200MW Pedi Photovoltaic Plant and Battery Energy Storage System near Groblershoop within the !Kheis Local Municipality, Northern Cape undertaken by Royal HaskoningDHV, 2020<sup>7</sup>.
- Proposed Development of 200MW Swati Photovoltaic Plant and Battery Energy Storage System near Groblershoop within the !Kheis Local Municipality, Northern Cape undertaken by Royal HaskoningDHV, 2020<sup>8</sup>.
- Proposed Development of 200MW Zulu Photovoltaic Plant and Battery Energy Storage System near Groblershoop within the !Kheis Local Municipality, Northern Cape undertaken by Royal HaskoningDHV, 2020<sup>9</sup>.

It should be noted that the above assessments considered ten (10) 132kV powerlines from the individual PV plants to connect to the Garona Substation that were subsequently approved by the Department of Forestry, Fisheries and the Environment (DFFE) in 2016 and 2020. The ten (10) 132kV powerlines will now be replaced by the new 400kV loop-in-loop-out (LILo) powerline into the existing Ferrum-Garona (loop-in) and Garona-Nieuwehoop (loop-out) 400kV powerlines.

<sup>4</sup> Reddy. P. 2020. Final Basic Assessment Report: Proposed Development of 200MW Venda Photovoltaic (PV) Plants on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape undertaken by Royal HaskoningDHV. Ref 14/12/16/3/3/2142.

<sup>5</sup> Reddy. P. 2020. Final Basic Assessment Report: Proposed Development of 200MW Sotho Photovoltaic (PV) Plants on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape undertaken by Royal HaskoningDHV. Ref 14/12/16/3/3/2145

<sup>6</sup> Reddy. P. 2020. Final Basic Assessment Report: Proposed Development of 200MW Afrikaans Photovoltaic (PV) Plants on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape undertaken by Royal HaskoningDHV. Ref 14/12/16/3/3/2147.

<sup>7</sup> Reddy. P. 2020. Final Basic Assessment Report: Proposed Development of 200MW Pedi Photovoltaic (PV) Plants on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape undertaken by Royal HaskoningDHV. Ref 14/12/16/3/3/2150.

<sup>8</sup> Reddy. P. 2020. Final Basic Assessment Report: Proposed Development of 200MW Swati Photovoltaic (PV) Plants on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape undertaken by Royal HaskoningDHV. Ref 14/12/16/3/3/2146.

<sup>9</sup> Reddy. P. 2020. Final Basic Assessment Report: Proposed Development of 200MW Zulu Photovoltaic (PV) Plants on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape undertaken by Royal HaskoningDHV. Ref 14/12/16/3/3/2151.

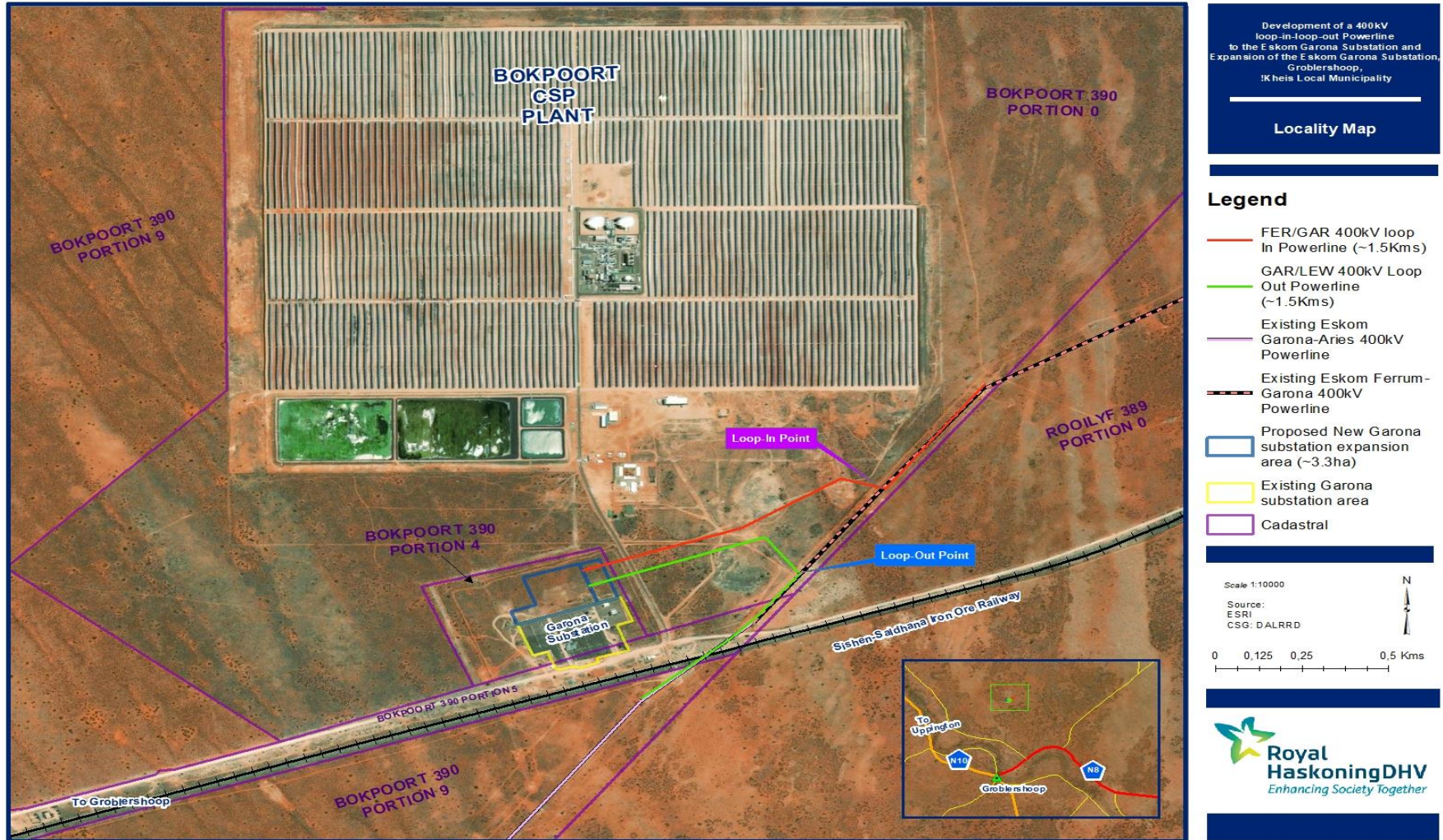


Figure 1-1: Locality map

## 1.2 Pre-application with Department of Forestry, Fisheries and the Environment

A pre-application meeting with DFFE was conducted on 01 June 2021 and a follow up email with approval of the approach was provided on 18 June 2021 whereby it was confirmed that:

- A new BA study will be required for the LILO as well as the substation extension as the project study area is within the Renewable Energy Development Zone (REDZ) and the Strategic Transmission Power Corridor.
- The Public Participation (PP) Plan submitted on 07 June 2021 was approved.

The Pre-application minutes and approval of the PP Plan is provided in **Appendix B**.

## 1.3 Basic Assessment Study

A BA is the level of environmental assessment applicable to activities listed in Listing Notices 1 and 3. A BA is applied to activities that are considered less likely to have significant environmental impacts and, therefore, unlikely to require a detailed EIA.

The BA aims to achieve the following:

- Determine the policy and legislative context within which the proposed activity is undertaken and how the activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed project;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Undertake an impact and risk assessment process inclusive of reasonably foreseeable cumulative impacts (where applicable). The focus being; determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the project and the risk of impact of the proposed activity on these aspects to determine the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and the degree to which these impacts:
  - can be reversed;
  - may cause irreplaceable loss of resources; and
  - can be avoided, managed or mitigated.

This final Basic Assessment Report (BAR) has been compiled in accordance with the stipulated requirements in GNR 326, Appendix 1 of the EIA Regulations, 2014 (as amended), which outlines the legislative BA process and requirements for assessment of outcomes, impacts and residual risks of the proposed development. The consultation BAR further incorporates the findings and recommendations of the specialist studies conducted for the project.

The Generic Environmental Management Programmes (EMPrs) for the substation and overhead electricity transmission infrastructure has been compiled according to Government Gazette No 42323, 22 March 2019), contemplated in Regulations 19(4), 23(4) and Appendix 4 of GNR 326 of the EIA Regulations, 2014 (as amended).

The EMPrs provide the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/ or eliminate any anticipated negative environmental impacts and to enhance positive impacts. The EMPrs provide strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.



## 1.4 Structure of the Basic Assessment Report

The BAR is structured as follows:

**Table 1-1: Structure of the report**

Appendix 1: Content of Basic Assessment Reports	Chapter/ Section
(a) details of <ul style="list-style-type: none"> <li>i) the EAP who prepared the report; and</li> <li>ii) the expertise of the EAP to carry out an environmental impact assessment</li> </ul>	Section 1.7
(b) The location of the activity (21-digit Surveyor General code, physical address and farm name where available, co-ordinates of the boundary of the property)	Section 2.1 & 2.2
(c) A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale or, if it is – a linear activity, a description of the route of the activity.	Figure 1-1
(d) A description of the scope of the proposed activity, including – <ul style="list-style-type: none"> <li>i) all listed and specified activities triggered and being applied for; and</li> <li>ii) a description of the activities to be undertaken including associated structures and infrastructure.</li> </ul>	Chapter 2 & 3
(e) A description of the policy and legislative context within which the development is proposed including – <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; and</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>	Chapter 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.	Section 2.4
(g) A motivation for the preferred site, activity and technology alternative.	Chapter 4
(h) A full description of the process followed to reach the proposed preferred alternative within the site. <ul style="list-style-type: none"> <li>i) details of all the alternatives considered;</li> <li>ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;</li> <li>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;</li> <li>iv) the environmental attributes associated with the alternatives focusing on the geographical, physical,</li> </ul>	Chapter 4 - 7

Appendix 1: Content of Basic Assessment Reports	Chapter/ Section
<p>biological, social, economic, heritage and cultural aspects;</p> <p>v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts –</p> <ul style="list-style-type: none"> <li>(aa) can be reversed;</li> <li>(bb) may cause irreplaceable loss of resources; and</li> <li>(cc) can be avoided, managed or mitigated.</li> </ul> <p>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.</p>	
<ul style="list-style-type: none"> <li>▪ 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 – <ul style="list-style-type: none"> <li>i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and</li> <li>ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.</li> </ul> </li> </ul>	Chapter 7
<ul style="list-style-type: none"> <li>▪ An assessment of each identified potentially significant impact and risk including – <ul style="list-style-type: none"> <li>a) cumulative impacts;</li> <li>b) the nature, significance and consequences of the impact and risk;</li> <li>c) the extent and duration of the impact and risk;</li> <li>d) the probability of the impact and risk occurring;</li> <li>e) the degree to which the impact and risk can be reversed;</li> <li>f) the degree to which the impact and risk may cause irreplaceable loss of resources; and</li> <li>g) the degree to which the impact and risk can be avoided, managed or mitigated.</li> </ul> </li> </ul>	Chapter 7
<ul style="list-style-type: none"> <li>▪ 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.</li> </ul>	Chapter 7 & Chapter 8
<ul style="list-style-type: none"> <li>▪ An environmental impact statement which contains- <ul style="list-style-type: none"> <li>i) a summary of the key findings of the environmental impact assessment;</li> <li>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</li> </ul> </li> </ul>	Chapter 8

Appendix 1: Content of Basic Assessment Reports	Chapter/ Section
iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	
<ul style="list-style-type: none"> <li>▪ Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.</li> </ul>	Chapter 7
<ul style="list-style-type: none"> <li>▪ 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.</li> </ul>	Section 8.6.1
<ul style="list-style-type: none"> <li>▪ A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.</li> </ul>	Section 8.5
<ul style="list-style-type: none"> <li>▪ 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.</li> </ul>	Section 8.6
<ul style="list-style-type: none"> <li>▪ Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised.</li> </ul>	N/A
<ul style="list-style-type: none"> <li>▪ An undertaking under oath or affirmation by the EAP in relation to:               <ol style="list-style-type: none"> <li>i) the correctness of the information provided in the reports;</li> <li>ii) the inclusion of comments and inputs from stakeholders and I&amp;APs;</li> <li>iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.</li> </ol> </li> </ul>	Section 8.7
<ul style="list-style-type: none"> <li>▪ Where applicable, details of any financial provisions for the rehabilitation, closure, and on-going post decommissioning management of negative environmental impacts.</li> </ul>	NA
<ul style="list-style-type: none"> <li>▪ Any specific information that may be required by the competent authority.</li> </ul>	a) <u>Listed activities - ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description – Chapter 3.</u> b) <u>Alternatives - provide a full description of the process followed to reach the proposed preferred alternative within the site - Chapter 4.</u> c) <u>Public participation process – A Comments and Response trail report (C&amp;R) must be submitted with the final report (<b>Appendix G</b>). The Public</u>

Appendix 1: Content of Basic Assessment Reports	Chapter/ Section
	<p>Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 &amp; 44 of the EIA Regulations 2014 as amended and as per the approved PP Plan (<b>Appendix G</b>).</p> <p>d) <u>Cumulative assessment - Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined – Section 7.4.4 and Section 8.3.</u></p> <p>e) <u>Undertaking of an oath – Section 8.7.</u></p> <p>f) <u>Details and expertise of the EAP – Section 1.7 and <b>Appendix D</b>.</u></p> <p>g) <u>Specialist assessments - Specialist Declaration of Interest forms must be attached to the final BAR (<b>Appendix C1 – C4</b>). Please note that specialist assessments must be conducted in accordance with these protocols. The Specialist Declaration of Interest forms must also indicate the scientific organisation registration/ member number and status of registration/ membership for each specialist.</u></p> <p>h) <u>Environmental Management Programme - It is drawn to your attention that for substation (<b>Appendix F</b>) and overhead electricity transmission (<b>Appendix E</b>) and distribution infrastructure the generic Environmental Management Programme, contemplated in Regulations 19(4) must be used and submitted with the final report over and above the EMPr for the facility – note that there is no facility considered for this project.</u></p> <p>i) <u>Environmental Impact Statement - It is noted that an environmental impact statement is not included in the draft BAR – an environmental impact statement is included in Chapter 8.</u></p> <p>j) <u>General - Please also ensure that the final BAR includes the period for which the Environmental Authorisation is required and the date on which the activity will be concluded – Section 8.6.1.</u></p>
<ul style="list-style-type: none"> <li>Any other matters required in terms of section 24(4)(a) and (b) of the Act.</li> </ul>	NA

## 1.5 Specialist Assessments

To ensure the scientific rigour of the BA study, as well as a robust assessment of impacts, a number of specialist inputs including the review and where applicable update of previously conducted and approved studies prepared for the previous 10 PV Plant projects were obtained. This was undertaken in order to comprehensively identify both potentially positive and negative environmental impacts (social and biophysical) associated with the proposed project, and where possible to provide mitigation measures to reduce the potentially negative impacts and enhance the positive impacts (Table 1-2). The specialist studies can be found in **Appendix C**.

**Table 1-2: Specialist assessments conducted for the project**

Specialist Study	Organisation	Appendix
Biodiversity and Offset Feasibility Investigation	Ecological Management Services	<i>Appendix C1</i>
Avifauna	Arcus Consulting Services	<i>Appendix C2</i>
Heritage	Johnny van Schalkwyk (private)	<i>Appendix C3</i>
Palaeontology	Natura Viva	<i>Appendix C4</i>

## 1.6 Details of the Project Developer

The Developer is Eskom, and the details of the responsible person are listed in Table 1-3 below.

**Table 1-3: Applicant details**

Applicant	Eskom Holdings SOC Ltd	
Representative	Mr Itumeleng Moeng	
Physical Address	1 Maxwell Drive, Megawatt Park, Sunninghill, Johannesburg	
Telephone	0118004114	
E-mail	MoengI@eskom.co.za	

## 1.7 Details of the Environmental Assessment Practitioner

The environmental team of Royal HaskoningDHV have been appointed as an Environmental Assessment Practitioners (EAP) by ACWA Power Project DAO (RF) Pty Ltd to undertake the appropriate environmental studies for this proposed project.

The professional team of Royal HaskoningDHV has considerable experience in the environmental management field. Royal HaskoningDHV has been involved in and/ or managed several of the largest EIAs undertaken in South Africa to date. A specialist area of focus is on the assessment of multi-faceted projects, including the establishment of linear developments (national and provincial roads, and powerlines), mixed-use developments, bulk infrastructure, and supply (e.g. wastewater treatment works, pipelines, landfills), electricity generation and transmission, urban, rural and township developments, environmental aspects of Local Integrated Development Plans, as well as general environmental planning, development and management. Royal HaskoningDHV have previously worked on the 10 PV Plants and have a good working knowledge of the project as a whole.

Details of the EAP are provided in Table 1-4 below.

**Table 1-4: EAP details**

Consultant	Royal HaskoningDHV	
Contact Persons	Prashika Reddy	Seshni Govender
Postal Address	PO Box 867, Gallo Manor, 2191	PO Box 867, Gallo Manor, 2191
Telephone	087 352 1577	087 352 1592
E-mail	prashika.reddy@rhdhv.com	Seshni.govender@rhdhv.com

Consultant	Royal HaskoningDHV	
<b>Qualification</b>	BSc (Hons) Geography BSc (Hons) Botany	BSc (Hons) Environmental Science
<b>Expertise</b>	Prashika Reddy is a Senior Environmental Scientist with 19 years' experience in various environmental fields including: EIAs, EMPs, PPP and environmental monitoring and audits. She is/ has been part of numerous multi-faceted large-scale projects, including the establishment of linear developments (roads and powerlines), industrial plants, electricity generation plants, mixed-use developments and mining projects. She is a Professional Natural Scientist (400133/10) with the South African Council for Natural Scientific Professions as well as a Registered EAP with EAPASA (2019/917).	Seshni Govender is an Environmental Consultant with 8 years' Environmental Consultant with nine (9) years working on compliance and strategic planning projects across South Africa. I have been involved in numerous Screening Studies, Basic Assessment, Water Use License projects, including complex integrated licensing that requires understanding cumulative environmental impacts. She is a Professional Natural Scientist (132741) with the South African Council for Natural Scientific Professions.

The Curriculum Vitae (CV) of the respective consultant can be found in **Appendix D**.

## 2 PROJECT DESCRIPTION

### 2.1 Property Details

The project area is located on the southern portion of the Farm Bokpoort 390 Remaining Extent (RE) which is 20km north-west of the town of Groblershoop within Ward 3 of the !Kheis Local Municipality in the ZF Mgcawu District Municipality, Northern Cape Province. The project site is situated approximately 77km south-east of Upington. The Orange River is located approximately 12km south-west of the site.

The loop-in to the Ferrum-Garona 400kV powerline and then loop-out into the Garona-Nieuwehoop 400kV powerline will be constructed within the existing powerline servitude that have been registered in Eskom's name. The landowner details as well as 21-digit surveyor general codes are provided in Table 2-1.

**Table 2-1: Property details**

Property	Owner	21 Digit Surveyor-General Code
Farm Bokpoort 390 RE	ACWA Power SolAfrica Bokpoort CSP Power Plant (Pty) Ltd (RF)	C0280000000038900000
Farm Bokpoort 390 Portion 4	Eskom Holdings SOC Ltd	C0280000000038900004
Farm Bokpoort 390 Portion 5	Eskom Holdings SOC Ltd	C0280000000038900005
Farm Bokpoort 390 Portion 9	ACWA Power SolAfrica Bokpoort CSP Power Plant (Pty) Ltd (RF)	C0280000000038900009

### 2.2 Project Location and Co-ordinates

The 250m co-ordinates for the 400kV LILO powerline and the corner points of the Garona Substation expansion area are provided in Table 2-2.

**Table 2-2: Project co-ordinates**

Component	Co-ordinates	Property Description	
Loop-in to the Ferrum-Garona 400kV powerline	1 (Start)	28°43'53.35"S; 22° 0'21.16"E	Farm Bokpoort 390 Remaining Extent Farm Bokpoort 390 Portion 4
	2	28°44'0.21"S; 22° 0'15.81"E	
	3 (Loop-in Point)	28°44'5.08"S; 22° 0'11.97"E	
	4 (Bend Point)	28°44'4.00"S; 22° 0'7.58"E	
	5 (Bend Point)	28°44'9.48"S; 21°59'58.23"E	
	6	28°44'12.25"S; 21°59'49.71"E	
	7 (End)	28°44'14.36"S; 21°59'43.40"E	
Expansion/Upgrade of the Garona Substation (Corner Points)	A	28°44'20.37"S; 21°59'37.32"E	Farm Bokpoort 390 Portion 4
	B	28°44'18.97"S; 21°59'36.76"E	
	C	28°44'18.18"S; 21°59'38.93"E	

Component		Co-ordinates	Property Description
	D	28°44'15.21"S; 21°59'37.81"E	
	E	28°44'13.63"S; 21°59'43.09"E	
	F	28°44'12.97"S; 21°59'45.06"E	
	G	28°44'17.31"S; 21°59'46.78"E	
Loop-out into the Garona-Nieuwehoop 400kV powerline	1 (Start)	28°44'16.05"S; 21°59'44.08"E	Farm Bokpoort 390 Remaining Extent Farm Bokpoort 390 Portion 4 Farm Bokpoort 390 Portion 5 Farm Bokpoort 390 Portion 9
	2	28°44'12.86"S; 21°59'53.70"E	
	3 (Bend Point)	28°44'10.57"S; 22° 0'0.57"E	
	4 (Loop-out Point)	28°44'14.66"S; 22° 0'3.80"E	
	5	28°44'21.90"S; 21°59'57.41"E	
	6	28°44'28.90"S; 21°59'48.94"E	

## 2.3 Technical Description

### 2.3.1 400kV Powerline

Table 2-3 shows the specifications for the 400kV powerline and tower structures which has been provided by Eskom as the 400kV LILO powerline and tower structures will need to meet the design requirements to tie into the existing Ferrum-Garona and Garona-Nieuwehoop powerlines.

**Table 2-3: 400kV powerline and tower specifications**

Parameter	Specification
Length of the LILO powerlines	Approximately 1km
Average span between structures	360m
Tower structures: a self-supporting tower will need to be used for the tie in	517A Self-supporting (45 degrees) suspension tower - Figure 2-1 Average footprint: 8.2. x 8.2m Average tower height: 26.9m
	517E Self-supporting (0 – 35 degrees) strain tower, and 517F Self-supporting (35 – 60 degrees) strain and 0 degrees terminal tower - Figure 2-2 Average footprint: 9.1m x 9.1m Average tower height: 27.5m
	518D Self-supporting (45 – 75 degrees) strain tower





Figure 2-1: Example of a 517A self-supporting suspension tower<sup>10</sup>



Figure 2-2: Example of 517E and F self-supporting strain tower<sup>11</sup>

### 2.3.1.1 Servitude

The servitude width for a 400kV powerline is 55m (27.5m on either side). The servitude is required to ensure the safe construction, maintenance and operation of the line, thereby entitling Eskom Transmission Division to certain rights (e.g. unrestricted access). Where 400kV powerlines are constructed in parallel, a minimum separation distance of 55m is required in order to ensure the reliable operation of the lines.

The minimum vertical clearance to buildings, poles and structures not forming part of the powerline must be 10.4m. Any farming activities can be practiced under the powerline, providing that safe working clearances and building restrictions are adhered to under all circumstances.

<sup>10</sup> Eskom Holdings SOC Limited. 2003. *Line Engineering Services: Eskom 400kV and 765kV Tower Guide: September 2013*

<sup>11</sup> *Ibid.*

The minimum distance of a 400kV powerline structure from a proclaimed public road is between 60 and 120m (according to the road type), from the centre of the structure to the centre of the road servitude. The minimum distance between any part of a tree or shrub and any bare phase conductor of a 400kV powerline must be 10m.

Optimal tower sizes and positions will be identified and verified using a ground survey (in terms of the Environmental Management Programme - EMP requirements).

### **2.3.1.2 Construction Process for a Powerline**

Powerlines are constructed in the following simplified sequence:

- Step 1: Determination of technically feasible alternatives.
- Step 2: EIA input into route selection and obtaining of relevant environmental permits.
- Step 3: Negotiation of final route with affected landowners.
- Step 4: Survey of the route.
- Step 5: Selection of best-suited structures and foundations.
- Step 6: Final design of powerline and placement of transmission towers.
- Step 7: Issuing of tenders and award of contract to construction companies.
- Step 8: Vegetation clearance.
- Step 9: Pegging of structures.
- Step 10: Construction of foundations.
- Step 11: Assembly and erection of structures.
- Step 12: Stringing of conductors.
- Step 13: Testing and commissioning.
- Step 14: Rehabilitation of disturbed areas and protection of erosion sensitive areas.
- Step 15: Continued maintenance.

### **2.3.1.3 Foundations**

The choice of foundation is influenced by the type of terrain encountered and the underlying geotechnical conditions. The actual size and type of foundation to be installed will depend on the soil bearing capacity (actual sub-soil conditions). Strain structures require more extensive foundations for support than in-line suspension structures, which contribute to the cost of the construction of the powerline. Foundations may be mechanically excavated where access to the tower position is readily available. The same usually applies to the pouring of concrete required for the setting of the foundations.

Prior to erecting the towers and filling of the foundations, the excavated foundations are protected in order to safeguard unsuspecting animals and people from possible injury. All foundations are back-filled, stabilised through compaction, and capped with concrete at ground level.

### **2.3.1.4 Insulators**

Composite insulators are used to connect the conductors to the towers. Glass and porcelain have previously been used to connect the conductors for many years and are the most common. These products are, however, heavy and susceptible to breakage by vandals and contamination by pollution. Composite insulators have a glass-fibre core with silicon sheds for insulation. Composite insulators are lightweight and resistant to both vandalism and pollution. Composite (Long rod type) insulators with silicone-based weather shed material will be used for strain assemblies. Composite horizontal line post insulators will be used for the intermediate structures and on the jumper supports.

### **2.3.1.5 Conductors**

The conductors are made of aluminium with a steel core for strength. Power transfer is determined by the area of aluminium in the conductors. Conductors are used singularly, in pairs, or in bundles of three, four or six. The choice is determined by factors such as audible noise, corona, and electro-magnetic field (E-MF) mitigation. The size of conductor to be used is based on the initial and life-cycle costs of different combinations of size and bundles, as well as the required load to be transmitted.

### **2.3.1.6 Stringing of Conductors**

A guide wire is used to string the conductors between towers. This can be undertaken mechanically or by hand. The powerline is generally strung in sections (from bend to bend). Cable drums are placed at 2km intervals (depending on the length of the conductor) during this stringing process. In order to minimise any potential negative impacts on the surrounding area, these cable drums are placed within the servitude.

### **2.3.1.7 Ongoing Maintenance**

During the life span of the powerline i.e. approximately 40 years, ongoing maintenance is required to be performed from time to time. This maintenance work may be undertaken by contractors employed by Eskom, and in compliance with the EMPs.

## **2.3.2 Garona Substation Extension and Upgrade**

The existing Garona Substation's footprint will be expanded by 3.75ha (footprint – 150m x 250m) to accommodate the loop-in to the Ferrum-Garona 400kV powerline to the Garona Substation and then loop-out into the Garona-Nieuwehoop 400kV powerline (Figure 2-3).

In addition, the following work will be undertaken:

- Establish a 400kV busbar at Garona Substation.
- Establish and equip 2 x 400kV feeder bays.
- Extend the 132kV busbar at Garona Substation (to accommodate the 400/ 132kV transformer).
- Install a 500MVA 400/ 132kV transformer with associated transformer bays.
- Provide space for 1 future 400/ 132kV transformer.
- Equip and commission the 1x 132kV feeder bay.

A facility illustration of the works at the Garona Substation is presented in Figure 2-4.

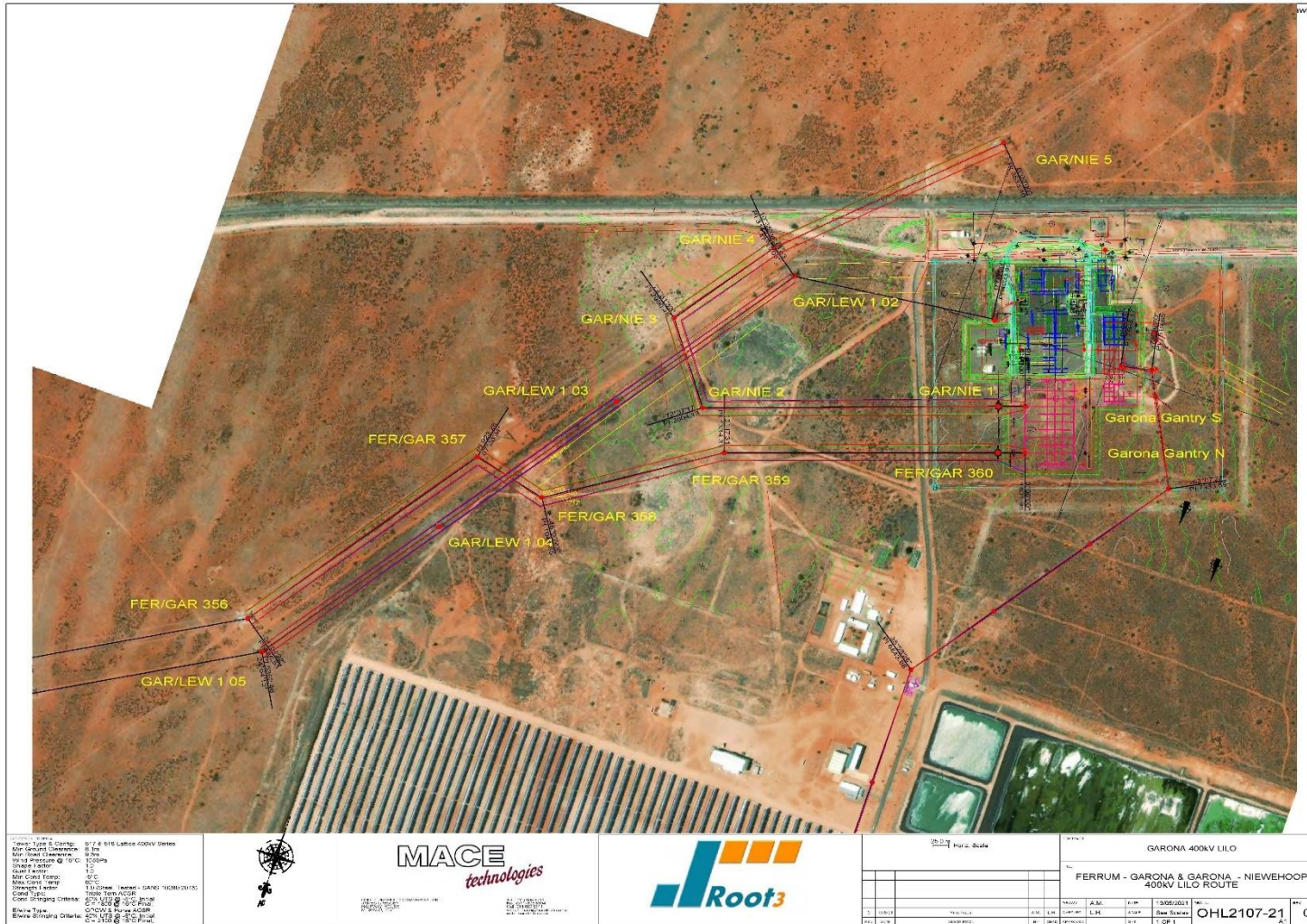


Figure 2-3: Proposed expansion area of the Garona Substation and loop-in-loop-out 400kV powerlines

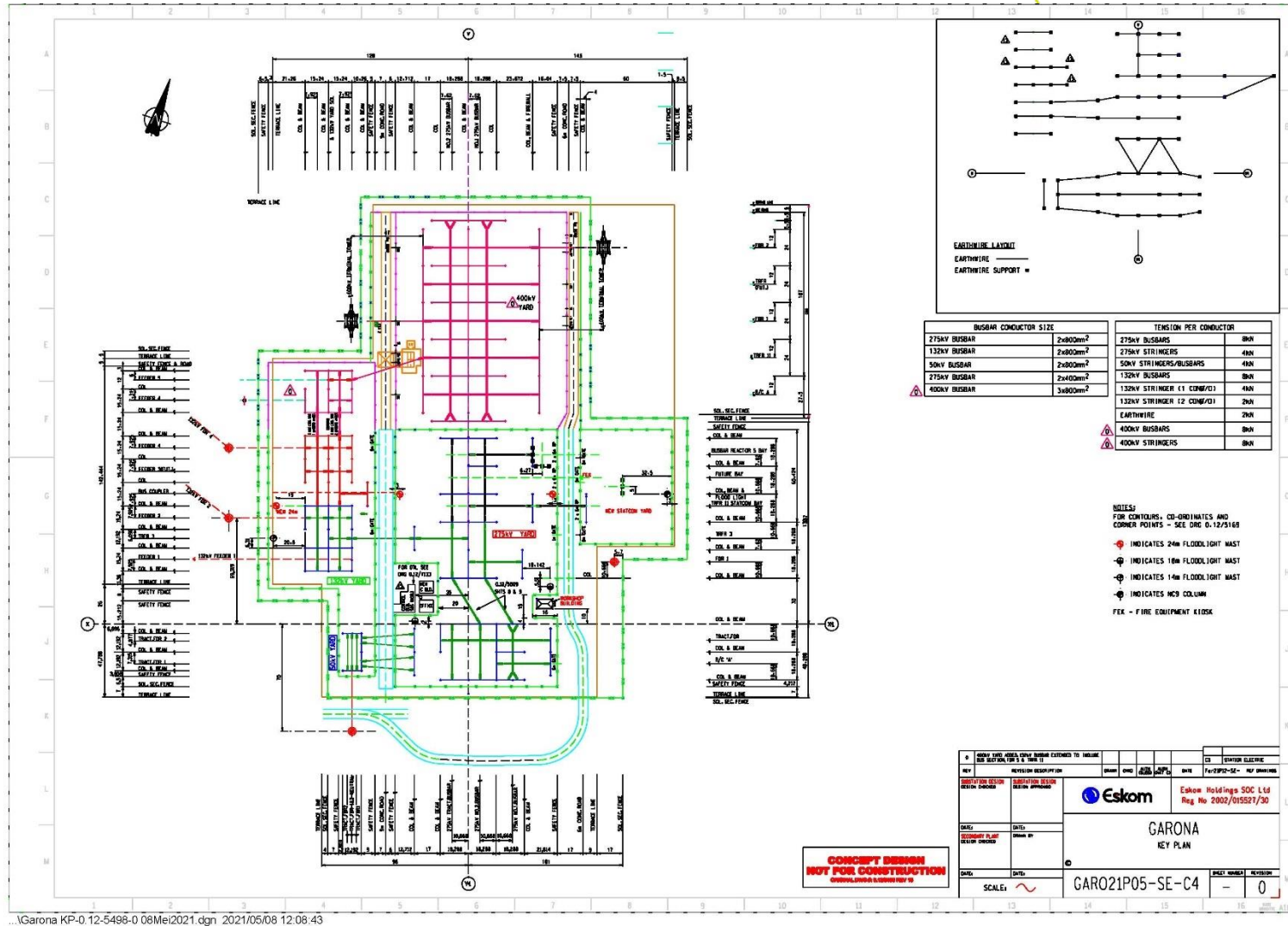


Figure 2-4: Facility illustration of the proposed works at the Garona Substation

### 2.3.3 Access

A vehicle access/ maintenance road is usually required to be established to allow access along the entire length of the servitude. Access is required during both the construction and operation/ maintenance phases of the powerline's life cycle. In order to reduce potential impacts associated with the construction of new access roads, existing roads will be used as far as possible where available. There is existing access to the Garona Substation as well as the Ferrum-Garona and Garona-Nieuwehoop powerline servitudes.

### 2.3.4 Construction Camp

The shared infrastructure area that was already authorised as part of the previous PV applications will be used for a construction camp and laydown area.

### 2.3.5 Construction Programme

Construction for the project is planned to commence in August 2021 and will be undertaken over a period of approximately 12 to 18 months, with completion aimed for July 2022, provided construction proceeds as scheduled.

### 2.3.6 Water for Construction

Water for construction activities will be provided by the Project DAO PV Plant.

## 2.4 Need & Desirability

**Table 2-4: Project need, desirability and benefits**

(i) Is the activity permitted in terms of the property's existing land use rights?	YES		Please explain
ACWA Power Solafrica Bokpoort CSP Power Plant (Pty) Ltd is the landowner of the Farm Bokpoort 390 RE, and Portion 9 has leased the property to ACWA Power Project DAO (RF) (Pty) for the development of the Bokpoort II project. On 11 January 2017, ACWA Power obtained an approval for the rezoning of farm for Agriculture Zone 1 to a Special Zone (Solar Energy Facility). The development of the LILO 400kV powerline on Portion 5 of the Farm Bokpoort 390 will occur within the existing Eskom powerline servitude. The development of the upgrade and expansion of the Garona Substation on Portion 4 of the Farm Bokpoort 390 is already being utilised for a substation. The activities are therefore permitted in terms of the respective properties existing land use rights.			

<b>(ii) Will the activity be in line with the following?</b>			
<b>(a) Provincial Spatial Development Framework (PSDF)</b>	<b>YES</b>		<b>Please explain</b>
<p>The proposed activity which is supporting infrastructure required for the efficient distribution of renewable energy can be considered in line with the Northern Cape Provincial Spatial Development Framework - PSDF (2018) Energy Policy, which states that “renewable energy sources (e.g. wind, solar thermal, biomass, and domestic hydroelectricity generation) are to comprise 25% of the province's energy generation capacity by 2030” and the PSDF Objectives which include “to promote the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts”.</p> <p>Recognising the suitability of the province to optimise the use of solar power, the Northern Cape PSDF has set the following energy objectives for the province:</p> <ul style="list-style-type: none"> <li>▪ to promote the development of renewable energy supply schemes;</li> <li>▪ to reinforce the existing transmission network and to ensure a reliable electricity supply in the Northern Cape;</li> <li>▪ to develop and institute innovative new energy technologies to improve access to reliable, sustainable and affordable energy services with the objective to realise sustainable economic growth and development; and</li> <li>▪ to develop and institute energy supply schemes with the aim to contribute to the achievement of the targets set by Integrated Resource Plan (IRP) 2010 – 2030.</li> </ul> <p>Solar thermal water heating and photovoltaic energy generation are to be compulsory, linked to main electricity sources as backup, on all new residential, commercial, industrial and community buildings, and should be progressively phased in as appropriate.</p>			
<b>(b) Urban edge / Edge of Built environment for the area</b>		<b>NO</b>	<b>Please explain</b>
<p>The project is located outside of the urban edge. The proposed development site is in a remote, rural area and so it will neither contribute to, nor compromise urban growth.</p>			
<b>(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).</b>		<b>NO</b>	<b>Please explain</b>
<p>According to the !Kheis Local Municipality IDP 2017-2022: “<i>The Municipality is in the middle of the Presidential Infrastructure Coordinating Committee (PICC), Strategic Infrastructure Program (SIP) and is therefore part of the Special Economic Development Zone of the Solar Corridor. !Kheis Municipal area could benefit from a number of programs that are not available to other Municipalities, and must be incorporated in the approach in the IDP.</i></p> <p><i>Solar energy is a natural resource like water, mining, iron and copper. A lot of macro-solar projects are being developed around the Municipality. Micro-solar opportunities can assist sustainability of the Municipality by attracting new businesses and provision of basic services to residents. The Municipal area has a high solar radiation which can open enormous potential of green technology and innovation such as powering solar vehicles to render basic services. This resource can be a major advantage to assist the poor rural communities in creation of jobs and providing electricity to under privilege families and business opportunities.</i>”</p> <p>Therefore, this project is in line for the vision for the Municipality towards a sustainable low carbon future.</p>			
<b>(d) Approved Structure Plan of the Municipality</b>		<b>NO</b>	<b>Please explain</b>
<p>As stated above a key opportunity for the Municipality is to develop green technologies. The unique positioning of the Municipality in the country allows it to achieve its green technologies objective. This is further supported by the Northern Cape PSDF which highlights the importance of renewable energy component of the surface infrastructure for the Municipality. Renewable energy orientated innovation and knowledge economy could play a critical role towards leap-frogging the green economy which could create enormous economic opportunities for the Northern Cape Province.</p>			

<p><b>(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)</b></p>		<p><b>NO</b></p>	<p><b>Please explain</b></p>
<p>The ZF Mgcawu District Municipality (formerly known as the Siyanda District) EMF within the !Kheis Municipality IDP (2014 - 2015) states that the climate of the area poses huge potential to utilise solar energy more widely, especially in the remote areas of the district. The proposed activity provides an additional economic resource to the area.</p> <p>Furthermore, this BA study is a mechanism of a management intervention that considers the principles of the National Environmental Management Act which includes sustainability.</p>			
<p><b>(f) Any other Plans (e.g. Guide Plan)</b></p>	<p><b>YES</b></p>		<p><b>Please explain</b></p>
<p>The IRP 2019 states that the “Solar PV, wind and Concentrated Solar Power (CSP) with storage present an opportunity to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Renewable technologies also present huge potential for the creation of new industries, job creation and localisation across the value chain.”</p> <p>According to the National Climate Change Adaptation Strategy - NCCAS (2019)<sup>12</sup> climate change is defined as a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/ or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces, such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use.</p> <p>The NCCAS provides a common vision of climate change adaptation and climate resilience for the country, and outlines priority areas for achieving this vision. The NCCAS goes beyond water, agriculture and commercial forestry, health, biodiversity and ecosystems, human settlements (urban, rural and coastal), and disaster risk reduction and management sectors to include transportation and infrastructure, energy, mining, oceans and coast. One of the actions to achieve climate change considerations is that all public infrastructure (including transport and energy infrastructure) be planned, designed, operated and managed after explicitly taking current and predicted future climate change impacts into account.</p>			

<sup>12</sup> Department of Environment, Forestry and Fisheries. 2019. National Climate Change Adaptation Strategy. Version UE10.



<b>(iii) Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?</b>	<b>YES</b>		<b>Please explain</b>
<p>From a cumulative impact perspective, the project poses no threat to the land uses, the location of the project is in a strategically important area known as the REDZ and Strategic Transmission Corridors.</p> <p>REDZ and Strategic Transmission Corridors are gazetted geographical areas:</p> <ul style="list-style-type: none"> <li>▪ The optimal location for strategic corridors where transmission infrastructure expansion is needed to enable the regionalised balancing of future demand and supply requirements, whilst minimising negative impacts to the environment</li> <li>▪ In which clusters (several projects) of wind and PV solar development will have the lowest negative impact on the environment while yielding the highest possible social and economic benefit to the country;</li> <li>▪ That are widely agreed to have strategic importance for wind and PV solar development;</li> <li>▪ Where the environmental and other authorisation processes have been aligned and streamlined based on scoping level pre-assessment and clear development requirements;</li> <li>▪ Where pro-active and socialised investment can be made to provide time efficient infrastructure access</li> </ul> <p>The study area falls within the REDZ 7 (Figure 2-5) which is earmarked for large scale solar energy facilities and the proposed 400kV powerline is within the Northern Corridor Strategic Transmission Corridor.</p> <p>As stated above, it is one of the initiatives of the Municipality to use this opportunity for the improvement of the community by ensuring that these solar plants directly benefit the Municipality through the creation of jobs as well as creating self-sufficient cities.</p>			
<b>(iv) Does the community / area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)</b>	<b>YES</b>		<b>Please explain</b>
<p>The recent power cuts or load shedding events by Eskom have emphasised the need for additional power generation capacity in South Africa. There is a focus on moving towards increased generation from renewable energy sources. The DMRE's RMIPPPP is designed to stimulate more independent power producers to meet the country's ever-growing electricity demand. The IRP 2019 being implemented by the DMRE, highlights the electricity demand forecasts and Government's plan to meet this demand through a variety of approaches and technologies, one of which is to implement more renewable energy projects.</p> <p>Due to South Africa's electricity generation and supply system being overloaded, the demand for an increased and stable electricity supply is a priority not only in the Northern Cape, but in all the other South African provinces. Solar energy plants are important for reducing the country's overall environmental footprint from power generation and for directing a pathway towards sustainability. Thus, the proposed project addresses a national/strategic priority.</p> <p>Further to the above, these activities have also been catered for in the Eskom Transmission Development Plan 2019 - 2028 as well as the plans for the expansion of the Eskom Garona Substation which has been planned to take into the consideration the increased input of electricity produced by the Independent Power Producers (IPP), which Eskom has committed capital to integrate the successful bidders from the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) into the National grid.</p>			
<b>(v) Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?</b>	<b>YES</b>		<b>Please explain</b>
<p>There is already an existing 400kV Ferrum and Nieuwehoop powerline network as well as the existing Garona Substation, and no services will be required from the Municipality. Domestic and office waste will be removed by a Contractor. All operation and maintenance activities to be undertaken by Eskom.</p>			

<b>(vi) Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?</b>		NO	Please explain
<p>The infrastructure required for the proposed development is to be provided and maintained by both the Developer and the end user, and it will not conflict with municipal infrastructure planning or priorities. In addition, the proposed development is to be constructed on overgrazed agricultural land outside of an urban area, with little or no existing or planned infrastructure.</p>			
<b>(vii) Is this project part of a national programme to address an issue of national concern or importance?</b>	YES		Please explain
<p>The project aims at meeting the National Development Plan objectives. The National Development Plan states the following as a priority objective: <i>Procuring at least 20 000 MW of renewable electricity by 2030, importing electricity from the region, decommissioning 11 000 MW of ageing coal-fired power stations and stepping up investments in energy-efficiency.</i></p> <p>The proposed activities are supporting infrastructure required for the efficient distribution of the renewable energy generated at the Project DAO PV Plant development as well as providing an opportunity to support Eskom in their efforts to roll out the grid strengthening projects within this region.</p>			
<b>(viii) Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)</b>	YES		Please explain
<p>The Northern Cape has been recognised as having the highest solar resource in the country and so is ideally suited to solar power generation. Furthermore, this is in keeping with the Bokpoort CSP Plant which is in its 5<sup>th</sup> year of operation that is close to the proposed site. The proposed site is well located in terms of proximity to Eskom's Garona Substation and road access (Transnet Service Road).</p> <p>From a cumulative impact perspective, the location of the project is in a strategically important area known as REDZ 7: Upington and the Northern Strategic Transmission Corridor and has been identified as one of the most suitable areas in the country for renewable energy development, in terms of several environmental impacts, economic and infrastructural factors.</p>			
<b>(ix) Is the development the best practicable environmental option for this land/site?</b>	YES		Please explain
<p>The site is within one of South Africa's eight REDZs i.e. <i>REDZ 7 Upington and the Northern Strategic Transmission Corridor</i>, applicable to large scale solar PV facilities and has therefore been identified as one of the most suitable areas in the country for renewable energy development, in terms of several environmental impacts, economic and infrastructural factors. Renewable energy development is therefore a very suitable land use option for the site. The property is already partly developed for renewable power generation. The current development (Bokpoort I) comprises a CSP parabolic trough facility generating 50 MW of electricity. The property is well located in terms of connection to power infrastructure and water availability.</p>			
<b>(x) Will the benefits of the proposed land use/development outweigh the negative impacts of it?</b>	YES		Please explain
<p>The proposed activity will assist in the supply of electricity derived from renewable resources into the National grid and will consequently increase the amount of electricity available to users. The site is well positioned for production of renewable energy given its proximity to a key grid substation and Eskom transmission lines together with access to water (Orange River).</p> <p>Potential negative impacts are anticipated however these can be mitigated.</p>			
<b>(xi) Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?</b>		NO	Please explain
<p>The existing Bokpoort I project has already set a precedent and the extension of renewable energy production at the site will be in line with the REDZ for large scale solar PV facilities. The Garona Substation and a 400kV powerline network has already been established in the project area and the activities are in support of ensuring the infrastructure can efficiently handle the additional electricity generated by the Project DAO PV Development.</p>			

<b>(xii) Will any person's rights be negatively affected by the proposed activity/ies?</b>		NO	Please explain
The public participation process will allow I&AP's an opportunity to raise any concerns with the proposed project.			
<b>(xiii) Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?</b>		NO	Please explain
Although the site falls outside of the urban edge, it is not foreseen that the proposed project and associated activities, will compromise the "urban edge" as the project components are specific to electricity transmission infrastructure.			
The proposed development site is located a short distance outside the rural town of Groblershoop and approximately 110 km by road from Upington. Infrastructure within these towns is under pressure from a variety of solar development projects which are currently under construction in the area. The introduction of a large construction workforce, as is typical of this type of development, will place further strain on the municipal infrastructure, but the relatively small workforce associated with the operation of the proposed development is unlikely to require an expansion of the urban edge of any town.			
<b>(xiv) Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?</b>	YES		Please explain
As stated previously the proposed activities of the loop-in to the Ferrum-Garona 400kV powerline and then loop-out into the Garona-Nieuwehoop 400kV powerline and the expansion and upgrade of the Garona Substation are supporting activities and are intrinsic to ensuring the success of the Project DAO PV development which has been awarded as part of the Strategic Integrated Project 20a emergency/ RMIPPPP.			
<b>(xv) What will the benefits be to society in general and to the local communities?</b>	Please explain		
The access to adequate electricity is a basic human right, which will also ensure the growth and development of the area is maintained as the project area is an important economic area within the Municipality.			
The project is also in line with Sustainable Development Goal 7 (SDG 7) which stipulates <i>Affordable and Clean Energy</i> for all. Investing in solar, wind and thermal power, improving energy productivity, and ensuring energy for all is vital if we are to achieve SDG 7 by 2030. Expanding infrastructure and upgrading technology to provide clean and more efficient energy in all countries will encourage growth and help the environment.			
<b>(xvi) Any other need and desirability considerations related to the proposed activity?</b>	Please explain		
<p><b>Society:</b> The operations will contribute electricity to the National grid, thereby improving Eskom's ability to meet the growing demands of the country. Additional power on the National grid will in turn mean a lesser likelihood of power outages and an increased amount of power for the Nation's industrial sector to operate more efficiently, which is of critical importance to the national economy.</p> <p><b>Communities:</b> The project will have a positive socio-economic impact with an increase in job opportunities and indirect economic spin offs. Among those employed for the project, skills will be developed through training thus bringing about empowerment for both permanent and temporary employees. The jobs generated would benefit households by uplifting their socio-economic standards through an increase in income. Secondary jobs and income sustainability will also be created in terms of repair and supply of the solar panels.</p> <p>The circulation of additional money within the micro-economy will also benefit those who are not directly affiliated with the project. As people will receive an increased income, they will have more money to spend on amenities for both themselves and their families, thus uplifting the local and national economy <i>via</i> the energy saved and jobs created from this initiative.</p>			

<b>(xvii) How does the project fit into the National Development Plan for 2030?</b>	<b>Please explain</b>
	<p>The National Development Plan for 2030 seeks to promote economic growth and development through the provision of quality energy services that are competitively priced, reliable and efficient. The National Development Plan also seeks to promote social equity through the expansion of access to energy services.</p> <p>The National Development Plan states the following as a priority objective: <i>Procuring at least 20 000 MW of renewable electricity by 2030, importing electricity from the region, decommissioning 11 000MW of ageing coal-fired power stations and stepping up investments in energy-efficiency.</i></p> <p>This project provides an opportunity to ensure the success to ensure that the PV plants operate optimally to ensure this goal is met.</p>
<b>(xviii) Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.</b>	<p>The impacts associated with the proposed project will be identified, predicted and evaluated to minimise negative impacts, maximise benefits and promote compliance with the principles of environmental management set out in Section 2 of NEMA (Section D). Mitigation and management measures to minimize negative impacts and maximize benefits from the proposed project have been included in the EMPs attached as <b>Appendix E-Generic Environmental Management Programme for a Transmission Lines</b> and <b>Appendix F- Generic Environmental Management Programme for a Substation</b> to this Report.</p>
<b>(xix) Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.</b>	<p>The proposed project will be sustainable in terms of the following:</p> <ul style="list-style-type: none"> <li>▪ Social: Local communities will benefit from the project in terms of receiving adequate electrical supply that serve to meet basic human needs. The local community and society in general will also benefit from the project in terms of direct and indirect job creation.</li> <li>▪ Economic: Provision of adequate electrical supply is a major contributor to the economic development. Society in general will benefit from the project in terms of indirect job creation as it will contribute to improving service delivery.</li> <li>▪ Environmentally: the proposed project will avoid as far as practically possible any environmentally and socially sensitive areas such as human settlements and where this is not possible, mitigation measures have been proposed to minimise the impact.</li> <li>▪ The EMPs (<b>Appendix E</b> and <b>Appendix F</b>) compiled provide the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/ or eliminate the anticipated negative environmental impacts.</li> </ul>

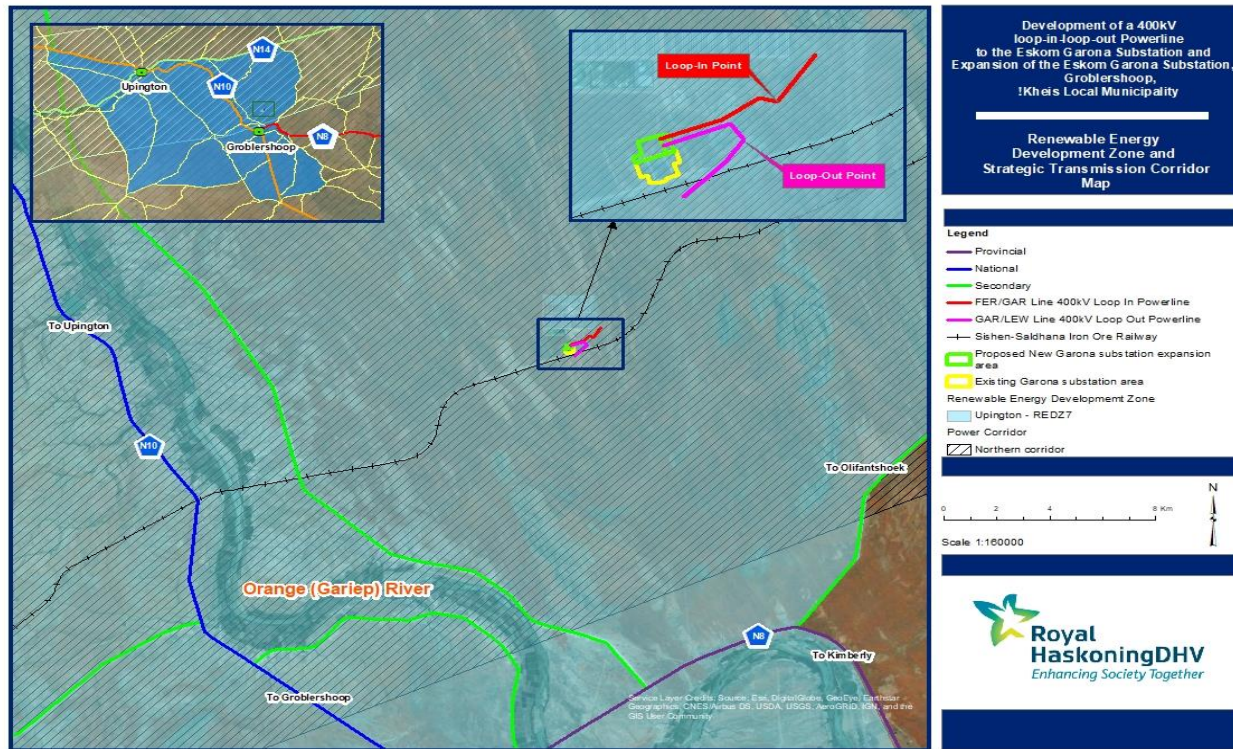


Figure 2-5: REDZ and strategic infrastructure corridor map

## 2.5 Socio-economic Value

The socio-economic details for the development (Overall project including the 400kV LILO powerline and Expansion and Upgrade of the Garona Substation) are provided in Table 2-5.

Table 2-5: Socio-economic details

Description	Details
What is the expected capital value of the activity on completion?	R 1.2 billion
What is the expected yearly income that will be generated by or as a result of the activity?	R 180 million
Will the activity contribute to service infrastructure?	Yes
Is the activity a public amenity?	No
How many new employment opportunities will be created in the construction phase of the activity?	100 to 250 construction jobs and 20 to 40 permanent operations and maintenance positions during its lifespan
What is the expected value of the employment opportunities during the construction phase?	R 350 million
What percentage of this will accrue to previously disadvantaged individuals?	This will be in-line with the economic obligations under the implementation agreement which will be between IPP and the DMRE

Description	Details
How many permanent new employment opportunities will be created during the operational phase of the activity?	20 - 40 jobs
What is the expected current value of the employment opportunities during the first 10 years?	R 20 million/ annum
What percentage of this will accrue to previously disadvantaged individuals?	This will be in-line with the economic obligations under the implementation agreement which will be between IPP and the DMRE

### 3 ENVIRONMENTAL LEGISLATIVE CONTEXT

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant environmental legislation (Table 3-1) that need to be considered during this study.

This section outlines the legislation that is applicable to the proposed project and has been considered in the preparation of this report.

**Table 3-1: Key legislation considered**

Acts	Objectives, Important Aspects, Associated Notices and Regulations
<p><b>National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended)</b></p>	<p><b>Objectives:</b> To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state.</p> <p><b>Relevant Notices and Regulations:</b></p> <ul style="list-style-type: none"> <li>▪ Environmental Impact Assessment Regulations, 2014 (GNR 326 in GG 40772 as amended on 07 April 2017)</li> <li>▪ Amendments to the Environmental Impact Assessment Regulations, Listing Notice 1, Listing Notice 2 and Listing Notice 3 of the Environmental Impact Assessment Regulations, 2014 for the Activities identified in terms of Section 24(2) and 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998)</li> <li>▪ Listing Notice 1 (GNR 327) as amended</li> <li>▪ Listing Notice 2 (GNR 325) as amended</li> <li>▪ Listing Notice 3 (GNR 324) as amended</li> </ul> <p><b>Relevance to the proposed project:</b></p> <ul style="list-style-type: none"> <li>▪ Development must be socially, environmentally and economically sustainable.</li> <li>▪ Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated; 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.</li> <li>▪ 'Polluter Pays' principle.</li> <li>▪ Any activity that is proposed and which is listed in the NEMA EIA Regulations, requires environmental authorisation.</li> </ul> <p><b>Listed Activity/ies &amp; Applicability:</b></p> <p><b>Listing Notice 1</b></p> <ul style="list-style-type: none"> <li>▪ Activity 27 - The clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation, except where such clearance of indigenous vegetation. <i>Applicability: The expansion of the substation will involve the clearance of 3.75ha of indigenous vegetation. The project site is located outside an urban area.</i></li> <li>▪ Activity 28 - Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture on or after</li> </ul>

Acts	Objectives, Important Aspects, Associated Notices and Regulations
	<p>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 ha. <i>Applicability: The expansion of the substation will involve the transformation of 3.75ha of agricultural land. The project site is located outside an urban area.</i></p> <ul style="list-style-type: none"> <li>▪ Activity 47 - The expansion of facilities or infrastructure for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase. <i>Applicability: The existing Garona Substation's footprint will be expanded by 3.75ha to accommodate the loop-in to the Ferrum-Garona 400kV powerline to the Garona Substation and then loop-out into the Garona-Nieuwehoop 400kV powerline (1km in length).</i></li> </ul> <p><b>Listing Notice 2</b></p> <ul style="list-style-type: none"> <li>▪ Activity 9 - The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex. <i>Applicability: Loop-in to the Ferrum-Garona 400kV powerline to the Garona Substation and then loop-out into the Garona-Nieuwehoop 400kV powerline (1km in length).</i></li> </ul>
<p><b>Northern Cape Nature Conservation Act (Act No. 9 of 2009)</b></p>	<p><b>Objectives:</b> The Northern Cape Nature Conservation Act (NCNCA) provides inter alia for the sustainable utilisation of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province. The Act also lists protected fauna and flora under 3 schedules ranging from Endangered (Schedule 1), protected (Schedule 2) to common (Schedule 3).</p> <p><b>Relevance to the proposed project:</b></p> <ul style="list-style-type: none"> <li>▪ Permit application relating to site clearance activities including the destruction and/ or translocation of any nationally or provincially listed species.</li> </ul>

### 3.1 Other Relevant Acts, Guidelines, Department Policies and Environmental Management Instruments

Table 3-2: Other relevant acts, guidelines, policies and environmental management instruments

Acts/Guideline/Policies/Environmental Management Instruments	Considerations
<p>The Constitution (No. 108 of 1996)</p>	<p>Chapter 2 – Bill of Right Section 24 – Environmental Rights</p>
<p><b>National Water Act (Act No. 36 of 1998) (as amended)</b></p>	<p>The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.</p>



Acts/Guideline/Policies/Environmental Management Instruments	Considerations
<p><b>National Environmental Management Biodiversity Act (Act No. 10 of 2004) and Regulations:</b></p> <ul style="list-style-type: none"> <li>▪ Threatened or protected species (GN 388)</li> <li>▪ Lists of species that are threatened or protected (GN 389)</li> <li>▪ Alien and invasive species regulations (GNR 506)</li> <li>▪ Publication of exempted alien species (GNR 509)</li> <li>▪ Publication of National list of invasive species (GNR 507)</li> <li>▪ Publication of prohibited alien species (GNR 508)</li> </ul>	<p>Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.</p>
<p><b>National Environmental Management: Waste Act (Act No. 59 of 2008) as amended</b></p>	<p>Section 17 - Every attempt must be made to reduce, recycle or re-use all waste before it is disposed.</p> <p>Section 25 - All waste (general and hazardous) generated during construction may only be disposed of at appropriately licenced waste disposal sites.</p> <p>All waste management activities (e.g., recycling, treatment) meeting the relevant thresholds should be authorised under the National Environmental Management: Waste Act (Act No. 59 of 2008) [NEM:WA] (as amended) and Government Notice (GN) 921 of 29 November 2013 (as amended in 2015 and 2017). No person may commence, undertake or conduct a waste management activity listed GN 921 (as amended) unless a licence is issued in respect of that activity.</p>
<p><b>National Environmental Management: Air Quality Act (Act No 39 of 2004)</b></p>	<p>Section 32 - Control of dust.</p> <p>Section 34 - Control of noise.</p> <p>Section 35 - Control of offensive odours.</p>
<p><b>National Heritage Resources Act (Act No. 25 of 1999)</b></p>	<p>Section 34 - No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.</p> <p>Section 35 - No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site.</p> <p>Section 36 - No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.</p>

Acts/Guideline/Policies/Environmental Management Instruments	Considerations
	Section 38 (a) - the construction of a road, wall, powerline, 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 5000m <sup>2</sup> in extent.
<b>Electricity Regulation Act No. 4 of 2006 as amended by the Electricity Regulation Amendment Act No. 28 of 2007</b>	These regulations regulate the use and generation of electricity.
<b>Occupational Health and Safety Act (Act No. 85 of 1993)</b>	Section 8 - General duties of employers to their employees. Section 9 - General duties of employers and self-employed persons to persons other than their employees.
<b>Construction Regulations (2014)</b>	Contractors must comply with the Construction Regulations which lay out the framework for construction related activities.

**Other:**

Hazardous Substance Act (Act No. 15 of 1973) and Regulations  
 Conservation of Agricultural Resources Act (Act No. 43 of 1983)  
 Civil Aviation Act (Act No. 13 of 2009) and Civil Aviation Regulations (CAR) of 1997  
 Electricity Act (Act No. 41 of 1987)  
 Civil Aviation Authority Act (Act No. 40 of 1998)  
 White Paper on Renewable Energy (2003)  
 Integrated Resource Plan for South Africa (2019)  
 Environmental Impact Assessment Guidelines for Renewable Energy Projects, GNR 989 of 2015 in terms of NEMA (Act No. 107 of 1998)  
 Land Use Planning Ordinance (Ordinance 15 of 1985)  
 National Road Traffic Act (Act No. 93 of 1996)  
 Procedure to be followed in Applying for Environmental Authorisation for Large Scale Wind and Solar Photovoltaic Energy Development Activities in terms of Section 24(2)a of NEMA, 1998 when occurring in Geographical Areas of Strategic Importance (GG No. 114, 16 February 2018)  
 National Climate Change Adaptation Strategy (2019) Version UE10  
 South African National Climate Change Response Policy (2011)  
 Carbon Tax Act (Act No. 15 of 2019)  
 National GN R154 National Noise Control Regulations  
 SANS 10103:2008, the *Measurement and Rating of Environmental Noise with Respect to Annoyance, and to Speech Communication*  
 SANS 10328:2008, *Methods for environmental noise impact assessments*  
 ZF Mgcawu District Municipality Integrated Development Plan 2017-2022  
 Northern Cape PSDF (2012) Energy Policy  
 !Kheis Local Municipality By-laws  
 Eskom Transmission Development Plan 2019 - 2028

### 3.2 International Conventions and Agreements

Relevant environmental and social international conventions and agreements to which South Africa is a party that is applicable to this project are presented in Table 3-3.

**Table 3-3: Relevant international conventions to which South Africa is a party<sup>13 14</sup>**

Convention	Summary of objectives or relevant conditions	South African Status
<b>Convention on Biological Diversity (29 December 1993)</b>	Develop strategies, plans or programs for conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programs which shall reflect, inter alia, the measures set out in this Convention.	Party to
<b>United Nations Framework Convention on Climate Change - Kyoto Protocol (23 February 2005)</b>	To further reduce greenhouse gas emissions by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries and through the clean development mechanism (CDM) (where developed countries can invest in developing country clean technology to offset emissions).	Party to
<b>Montreal Protocol on Substances That Deplete the Ozone Layer (1 January 1989)</b>	Calculated levels of consumption and production of CFCs must not exceed the stipulated thresholds.	Party to
<b>United Nations Convention to Combat Desertification (26 December 1996)</b>	To combat desertification and mitigate the effects of drought through national action programs.	Party to
<b>United Nations Framework Convention on Climate Change (21 March 1994)</b>	Protection of the climate system: Operations must protect the climate system by controlling greenhouse gases not controlled by the Montreal Protocol, which cause climate change through anthropogenic interference with the climate system.	Party to
<b>Stockholm Convention on Persistent Organic Pollutants (POPs) (17 May 2004)</b>	This convention seeks to ban the production and use of persistent organic chemicals but allow the use of some of these banned substances, such as DDT, for vector control.	Party to
<b>The Fourth ACP-EEC Convention 15 December 1989 (Lome)</b>	Control of hazardous and radioactive waste: the operation must be aware that international law emphasizes strict control of hazardous waste and compliance with domestic legislation in this regard. It also seeks to prohibit imports and exports of such substances.	Party to
<b>Convention concerning the Protection of the World Cultural and Natural Heritage 1972 (Paris)</b>	Ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage	Ratification

<sup>13</sup> Sources: United States Central Intelligence Agency World Fact book ([www.cia.gov/library/publications/the-world-factbook/index.html](http://www.cia.gov/library/publications/the-world-factbook/index.html))

<sup>14</sup> Schlechter, M., & Baxter, B. 2016. Final EIA Report: Proposed 75MW Photovoltaic (PV2) Solar Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape. Golder Associates. Ref 14/12/16/3/3/2/880.

Convention	Summary of objectives or relevant conditions	South African Status
<b>Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (24 February 2004)</b>	Promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm	Party to
<b>Paris Agreement adopted on 12 December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC CoP21)</b>	<p>The Agreement is a comprehensive framework which will guide international efforts to limit greenhouse gas emissions and to meet all the associated challenges posed by climate change.</p> <p>The main objective of the Agreement is to limit the global temperature increase to well below 2 degrees Celsius, while pursuing efforts to limit the increase to 1.5 degrees.</p>	Ratified

### 3.3 International Standards

#### 3.3.1 International Finance Corporation Performance Standards

ACWA Power is committed to complying with the International Finance Corporation (IFC) Performance Standards (PS) on social and environmental sustainability. These were developed by the IFC and were last updated on 1<sup>st</sup> January 2012.

The PS comprise of eight performance standards as described in Table 3-4.

**Table 3-4: IFC Performance Standards**

Objective	Applicability
<p><b>PS 1: Assessment and Management of Environmental and Social Risks and Impacts</b></p> <p>Guidance note on the categorisation of projects during project screening, requirements for institutional capacity and requirements for public consultation and disclosure.</p>	<p>This BA study supported by comprehensive specialist assessments, the respective specialists (<b>Appendix C1 – C4</b>) has identified environmental and social risks and impact of the project and provide mitigation measures to enhance positive impacts and minimise negative impacts, where applicable.</p> <p>The impact assessment is consistent with Good International Industry Practices (GIIP) and takes into account the nature, extent, duration, intensity, probability and significance of the identified impacts both before and after mitigation measures (<b>Chapter 7</b>). Cumulative impacts that result from the incremental impacts on areas or resources directly impacted by the project have also been identified and noted in the study (<b>Chapter 7</b>).</p> <p>The EMPs (<b>Appendix E &amp; F</b>) provides the actions for the management of identified environmental impacts and a detailed outline of the implementation programme. The EMPs provide strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.</p>

Objective	Applicability
	<p>Extensive engagement has taken place with project affected people for the previously authorised 10 PV plants and will also continue for this proposed project (<b>Chapter 6</b>).</p>
<p><b>PS 2: Labour and Working Conditions</b> Recognises that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers, including health and safety. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention and can jeopardise a project.</p>	<p>The overall project development (Project DAO PV Development and 400kV LILO powerline and upgrade and expansion of the Garona Substation) will provide employment opportunities for 100 – 250 people during the construction phase and 20 – 40 people during the operations phase.</p> <p>Prior to development, human resource policies and procedures, working conditions and terms of employment, equal opportunity, retrenchment policy and a formal grievance mechanism must be established to promote the fair treatment, non-discrimination and equal opportunity of workers in line with national employment and labour laws.</p> <p>Further to this, the Developer also has an obligation to provide a safe and healthy work environment for its employees in terms of the Occupational Health and Safety Act (Act No. 85 of 1993).</p>
<p><b>PS 3: Resource Efficiency and Pollution Prevention</b> Recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. More efficient and effective resource use and pollution prevention and greenhouse gas emission avoidance and mitigation technologies enhance the efficiency and sustainability of the project.</p>	<p>Pollution prevention measures contained in this report and EMPs (<b>Appendix E &amp; F</b>) are in line with GIIP and contain comprehensive management outcomes and impact management actions for waste generation during the different project phases as well as the storage and use of hazardous substances.</p>
<p><b>PS 4: Community Health, Safety and Security</b> Recognises that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. This Performance Standard addresses the Promotor' responsibility to avoid or minimise the risks and impacts to community health, safety, and security.</p>	<p>The proposed project will be designed, constructed, operated and decommissioned in accordance with GIIP. Mitigation measures and controls are provided in the EMPs (<b>Appendix E &amp; F</b>) for spills, incidents and pollution control as well as for containment losses of hazardous substances associated with the 400kV LILO powerline and upgrade and expansion of the Garona Substation. An Emergency Preparedness and Response Plan must be compiled by the Developer for the project prior to implementation.</p> <p>Traffic and dust impacts have been assessed as being moderate prior to the implementation of mitigation measures and have to be carefully managed as these impacts have been documented during the stakeholder engagement processes for previous environmental assessments and approvals as being major safety and nuisance factors.</p> <p>An adequate resolution needs to be obtained regarding the upgrading (re-gravelling, surfacing etc.) of existing roads and intersections in the study area separate to this environmental assessment process. This resolution/ agreement requirement</p>

Objective	Applicability
	prior to any construction taking place was also a condition imposed within a previously issued environmental authorisation
<p><b>PS 5: Land Acquisition and Involuntary Resettlement</b></p> <p>Recognises that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use, while temporary or permanent.</p>	<p>No physical or economic displacement and resettlement of people will take place. In terms of land acquisition, the study area is owned by ACWA Power SolAfrica Bokpoort CSP Power Plant (Pty) Ltd (RF) and Eskom.</p>
<p><b>PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources</b></p> <p>Recognises that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.</p>	<p>The project will not impact any proclaimed protected biodiversity area.</p> <p>The initial assessment<sup>15</sup> of the critical habitats have shown that apart from the rocky outcrop to the north of the study area associated with the Koranna-Langeberg Mountain Bushveld Vegetation type which is classified as a Natural Habitat, the calcareous low shrub plains, open shrub plains, open shrub duneveld and transformed areas are classified as Modified Habitats. This rocky outcrop is not affected by the proposed project.</p> <p>The Biodiversity Assessment (<b>Appendix C1</b>) was compiled with impacts managed in line with the mitigation hierarchy. A biodiversity offset has therefore been mandated for the Bokpoort Solar development, to ensure that all residual impacts associated with the development as a whole are adequately compensated, the offset area calculation has included all aspects/ phases of the project including the expansion of the Garona Substation.</p> <p>A Biodiversity Offset Feasibility Investigation has been conducted and the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NCDAERL) have made recommendations.</p> <p>Further mitigation measures associated with the protection of fauna and flora and management of alien invasive species have been included in the EMPs (<b>Appendix E &amp; F</b>).</p>

<sup>15</sup> Bathusi Environmental Consulting cc.2019. Ecological Basic Impact Assessment of the proposed 200 MW Solar Power Development that will be situated on the Remaining Extent of Farm Bokpoort 390 within the !Kheis Local Municipality (ZF

Objective	Applicability
<p><b>PS 7: Indigenous Peoples</b> Recognises that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalised and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development.</p>	<p>The Socio-economic study<sup>16 17 18</sup> confirmed that there is no evidence of the presence of any indigenous people residing or utilising the project area and immediate surrounds.</p>
<p><b>PS 8: Cultural Heritage</b> Recognises the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that protect cultural heritage in the course of their project activities.</p>	<p>A comprehensive Heritage Impact Assessment<sup>19</sup> (<b>Appendix C3</b>) and Desktop Palaeontology Impact Assessment<sup>20</sup> (PIA) together with Chance Find Protocol (<b>Appendix C4</b>) were conducted for the initial assessment for the previously authorised PV Plants, the addition of the 400kV LILO powerline and upgrade and expansion of the Garona Substation has not resulted in any changes the assessment of impacts and therefore the finding are still applicable to this BA study.</p> <p>No sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development. Should archaeological sites or graves be exposed in other areas during construction work, measures and controls have been stipulated in this report and EMPs (<b>Appendix E &amp; F</b>) for the management of the site/graves.</p> <p>No significant fossil heritage resources have been recorded within the study area. The area is inferred to be of low sensitivity in terms of palaeontological heritage and no sensitive or no-go areas have been identified within it during the desktop PIA. In the case of any significant chance fossil finds during construction (e.g. vertebrate teeth, bones, burrows, petrified wood, shells), these must be safeguarded - preferably in situ - and reported as soon as possible to the South African Heritage Resources Agency (SAHRA).</p>

<sup>16</sup> Smith, T; de Waal, D. 2016. Socio-economic Impact Assessment for the proposed 75 MW Photovoltaic (PV1) Solar Facility (Bokpoort II Solar Development). Report No 1400951-302448-18.

<sup>17</sup> Smith, T; de Waal, D. 2016. Socio-economic Impact Assessment for the proposed 75 MW Photovoltaic (PV2) Solar Facility (Bokpoort II Solar Development). Report No 1400951-303533-1.

<sup>18</sup> Smith, T; de Waal, D. 2016. Socio-economic Impact Assessment for the proposed 150 MW CSP Tower Facility (Bokpoort II Solar Development) on the Remaining Extent of the Farm Bokpoort 390, Northern Cape. Report No 1400951-299899-7.

<sup>19</sup> Van Schalkwyk, J.A. 2021. Phase 1 Cultural Heritage Impact Assessment: The Proposed Construction of The Ferrum – Garona and Garona – Niewehoop 400kV LILO Route And Expansion of the Garona Substation for Project Dao Near Groblershoop, !Kheis Local Municipality, Northern Cape Province

<sup>20</sup> Almond, J.E. 2020. Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province. Palaeontological impact assessment: desktop study, 17 pp. Natura Viva cc, Cape Town.

### 3.4 Equator Principles

The Equator Principles (EPs) is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence and monitoring to support responsible risk decision-making.

Project finance is often used to fund the development and construction of major infrastructure and industrial projects.

The EPs are adopted by financial institutions and are applied where total project capital costs exceed US\$10 million. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are based on the IFC PS 2012 and on the World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

The Equator Principles Financial Institutions (EPFIs) have consequently adopted these Principles in order to ensure that the projects they finance are developed in a manner that is socially responsible and reflect sound environmental management practices.

EPFIs will only provide loans to projects that conform to the following principles:

- Principle 1: Review and Categorisation;
- Principle 2: Social and Environmental Assessment;
- Principle 3: Applicable Social and Environmental Standards;
- Principle 4: Action plan and Management;
- Principle 5: Consultation and Disclosure;
- Principle 6: Grievance Mechanism;
- Principle 7: Independent review;
- Principle 8: Covenants;
- Principle 9: Independent Monitoring and Reporting; and
- Principle 10: EPFI Reporting.

The proposed project is a Category B project with potential limited adverse environmental or social risks and/ or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.

#### 3.4.1 The World Bank Group Environmental Health and Safety (EHS) Guidelines

The EHS Guidelines (World Bank Group, 2007) are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). Reference to the EHS guidelines is required under IFC PS 3.

The EHS Guidelines contain the performance levels and measures normally acceptable to the IFC and are generally considered to be achievable in new facilities at reasonable cost. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever standard is more stringent.

### 3.5 Sustainable Development Goals

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. South Africa has embraced sustainable development



as its development approach and is fully committed to the 2030 Agenda for Sustainable Development, its principles, goals, targets and indicators.

The 17 SDGs recognise that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability.



**Figure 3-1: Sustainable Development Goals**

SDG 7 requires Affordable and Clean Energy for all. Investing in solar, wind and thermal power, improving energy productivity, and ensuring energy for all is vital if we are to achieve SDG 7 by 2030. Expanding infrastructure and upgrading technology to provide clean and more efficient energy in all countries will encourage growth and help the environment<sup>21</sup>.

SDG 13 advocates taking urgent action to combat climate change and its impacts. The Paris Agreement is universally regarded as a seminal point in the development of the international climate change regime under the UNFCCC. The main objective of the Agreement is to limit the global temperature increase to well below 2 degrees Celsius, while pursuing efforts to limit the increase to 1.5 degrees. The recognition of the 1.5-degree target is of central importance to South Africa as an African and developing country that is highly vulnerable to climate change.

<sup>21</sup> <https://sustainabledevelopment.un.org/sdg7>

## 4 PROJECT ALTERNATIVES

In terms of the EIA Regulations 2014 (as amended) feasible alternatives are required to be considered as part of the environmental investigations. In addition, the obligation that alternatives are investigated is also a requirement of Section 24(4) of the NEMA (Act No. 107 of 1998) (as amended).

An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity which may include alternatives to:

- the property on which or location where it is proposed to undertake the activity;
- the type of activity to be undertaken;
- the design or layout of the activity;
- the technology to be used in the activity;
- the operational aspects of the activity; and
- the option of not implementing the activity.

### 4.1 Powerline Route and Substation Site Alternatives

The development of the 400kV LILO powerline will need to loop-in to the existing Ferrum-Garona 400kV powerline and loop-out to the existing Garona-Nieuwehoop 400kV powerline. Both 400kV Ferrum-Garona and Garona-Nieuwehoop powerlines enter and exit the existing Garona Substation which will need to be upgraded and expanded to cater for the additional 400kV LILO powerline. No site alternatives have been considered for the powerline route alignment or the substation upgrade and expansion. A new substation site alternative has also been proposed as discussed below.

### 4.2 Design Alternatives

#### 4.2.1 Option 1 (Preferred)

Option 1 involves the establishment of the new 400kV powerline that will loop-in at the existing Ferrum-Garona powerline and loop-out of the existing Garona-Nieuwehoop powerline. This has been catered for in the Eskom Transmission Development Plan 2019 - 2028 as well as the plans for the expansion of the Eskom Garona Substation which has been planned to take into the consideration the increased input of electricity produced from IPPs, which Eskom has committed capital to integrate the successful bidders from the REIPPPP into the National grid.

The scope of work at Garona Substation includes the following:

- Establish a 400kV busbar at Garona Substation.
- Establish and equip 2 x 400kV feeder bays.
- Extend the 132kV busbar at Garona Substation (to accommodate the 400/ 132kV transformer).
- Install a 500 MVA 400/132 kV transformer with associated transformer bays.
- Provide space for 1 future 400/132 kV transformer.
- Equip and commission the 1x 132kV feeder bay.

#### 4.2.2 Option 2

This option will only require the project to build a new substation (Figure 4-1) on the project DAO site with a 400kV loop-in and loop-out toward the Ferrum-Nieuwehoop 400kV powerline (which runs adjacent to the project site). It will not require any pylons/ towers to be constructed in any unauthorised areas. The exact same scope will be facilitated within the project substation site boundary as Option 1.

Project DAO Substation components:

- Establish a 400kV busbar at DAO Substation,
- Establish and equip 2 x 400kV feeder bays.
- Loop-in and loop-out of Ferrum–Nieuwehoop 400kV line (existing).
- Install a 500MVA 400/ 132kV transformer with associated transformer bays.
- Equip and commission the 1 x 132kV feeder bay.
- Provide space for 1 future 400/ 132kV transformer.

In consultation with Eskom, Option 1 is the most feasible due to risk and safety factors as two 400kV substations may not be constructed in close proximity to each other as the Garona Substation and the proposed new Project DAO substation are located within a distance of 1.6km to each other. In addition to this, Eskom has planned for the expansion and upgrade of the Garona Substation which will accommodate all future growth in terms of the electricity generated by the successful bidders within this area, with ACWA Power Project DAO (RF) (Pty) Ltd being the first to obtain preferred bidder status. The expansion of the existing Garona Substation will result in the environmental impacts being clustered together. Therefore, this option is not preferred.

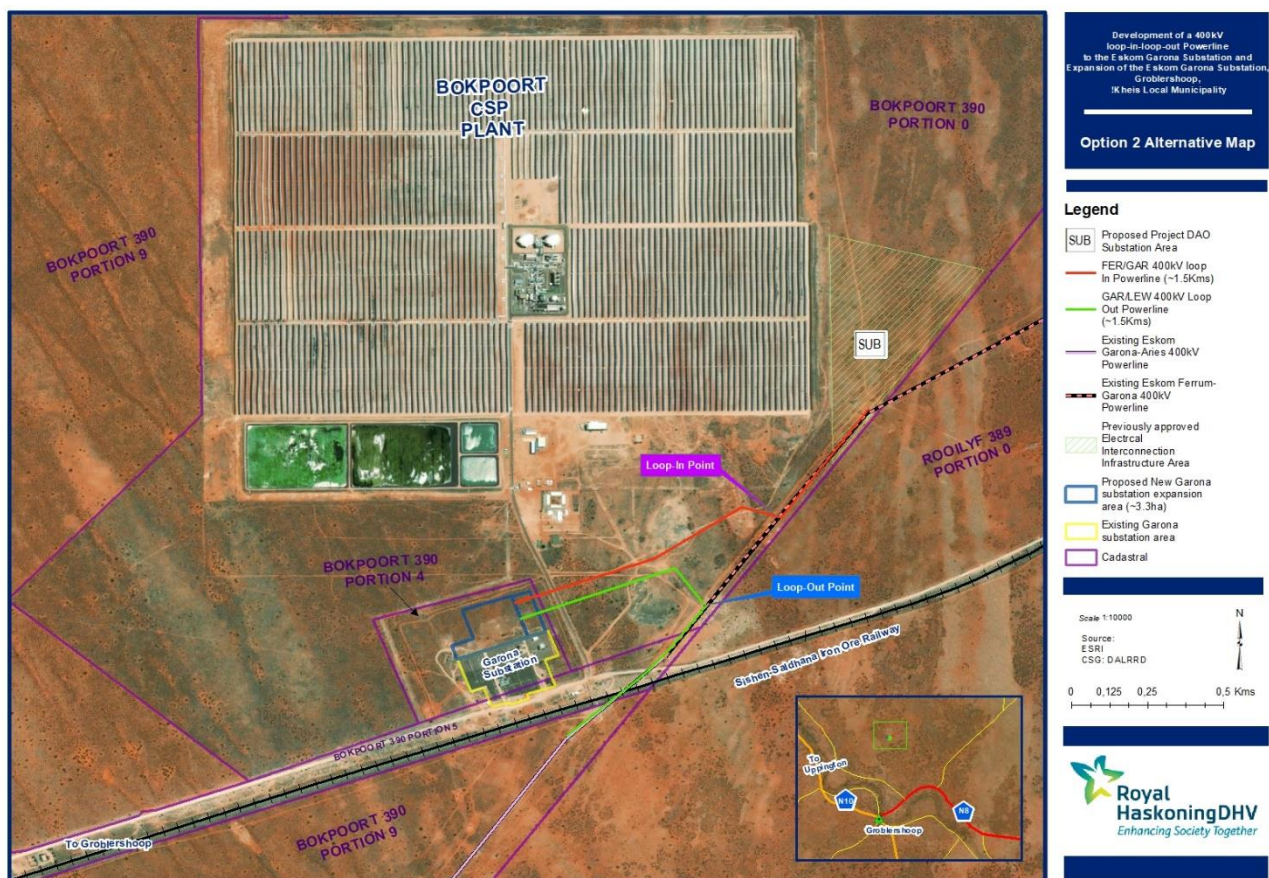


Figure 4-1: Option 2 layout map

### 4.3 No-Go Alternative

The No-Go alternative is the option of not establishing a 400kV LILO powerline and the expansion and upgrade of the Garona Substation to accommodate the electricity generated by the Project DAO PV Plant development at the identified site in the Northern Cape Province. The electricity generated will have to be evacuated to suitable grid infrastructure to enable the electricity to be distributed further via the National grid. The currently authorised 132kV powerlines cannot be considered further as Eskom requires this additional infrastructure for additional capacity to be injected to the grid.

With an increasing demand in energy predicted and growing environmental concerns about fossil fuel-based energy systems, the development of large-scale renewable energy supply schemes such as PV is strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports in the country.

Without the implementation of this project, the use of renewable options for power supply will be compromised in the future. This has potentially significant negative impacts on environmental and social well-being.

Therefore, the No-Go option is not considered as a feasible option on this proposed project.

## 5 DESCRIPTION OF THE BASELINE ENVIRONMENT

The following section describes the biophysical and socio-economic environment that may be affected by the proposed development of the 400kV LILO powerline and the expansion and upgrade of the Garona Substation. The baseline studies for the authorised Bokpoort I project, for a concentrated solar thermal power plant project<sup>22</sup>, and more detailed studies<sup>23 24 25</sup> focussing on significant environmental aspects of the proposed development were consulted to describe the baseline conditions.

### 5.1 Geology

The geology of the area is generally characterised by metamorphosed sediments and volcanic intruded by granites and is known as the Namaqualand Metamorphic Province.

Groblershoop is located on the Kalahari Group. The Kalahari Group is divided into four formations. At the base is a soft, clay gravel of fluvial origin (the Wessels Formation). Upon this follows calcareous claystone with interlayered gravel (the Budin Formation). This is in turn overlain by clay-containing, calcareous sandstone (the Eden Formation). Upon the Eden Formation follows the aeolian surface which is characteristic of the group (the Gordonia Formation)<sup>26</sup>. The proposed solar development project site is situated on red-brown windblown sands of the Gordonia Formation, Kalahari Group.

The general geology of the site mainly comprises red-brown, coarse grained granite gneiss and quartz-muscovite schist, quartzite, quartz-amphibole schist and greenstones of the Groblershoop formation, Brulpan group. Calcrete is also present, especially in the south-eastern part of the area (Figure 5-1).

Dune ridges occur in the northern portions of the site and are characterised by NNW-SSE orientation. Calcrete outcrops occur approximately 2km west and southwest from the Garona Substation. An anticlinal structure (upward pointing fold) causes the Groblersdal formation to be elevated in the area to the east of the site where it forms a range of hills known as the Skurweberge.

<sup>22</sup> Benedek, F; Roods, M. 2011. *Environmental Impact Assessment for a Proposed 75MW Concentrating Solar Thermal Power Plant and Associated Infrastructure in the Siyanda District, Northern Cape*. Bohlweki SSI Environmental. DEA Reference number: 12/12/20/1920.

<sup>23</sup> Schlechter, M., & Baxter, B. 2016. *Final EIA Report: Proposed 150MW CSP Tower Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape*. Golder Associates. Ref 14/12/16/3/3/2/879.

<sup>24</sup> Royal HaskoningDHV. 2020. *Proposed 200MW Ndebele and Xhosa Photovoltaic Plant Developments and Associated Battery Energy Storage System on the Remaining Extent of the Farm Bokpoort 390 near Groblershoop with the !Kheis Local Municipality in the Northern Cape Province*. Final Basic Assessment Report. Ref 14/12/16/3/3/1/2148 and Ref 14/12/16/3/3/1/2149

<sup>25</sup> Royal HaskoningDHV. 2020. *Basic Assessment for the Proposed Development of Eight 200MW Photovoltaic (PV) Plants on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape*. Final Consultation Basic Assessment Report. Ref 14/12/16/3/3/1/2142, 2143, 2144, 2145, 2146, 2147, 2150, 2151

<sup>26</sup> Council for Geoscience. 2016. *Simplified Geology of the Northern Cape Province*. Retrieved January 26, 2016, from Council for Geoscience: [www.geoscience.org.za](http://www.geoscience.org.za)

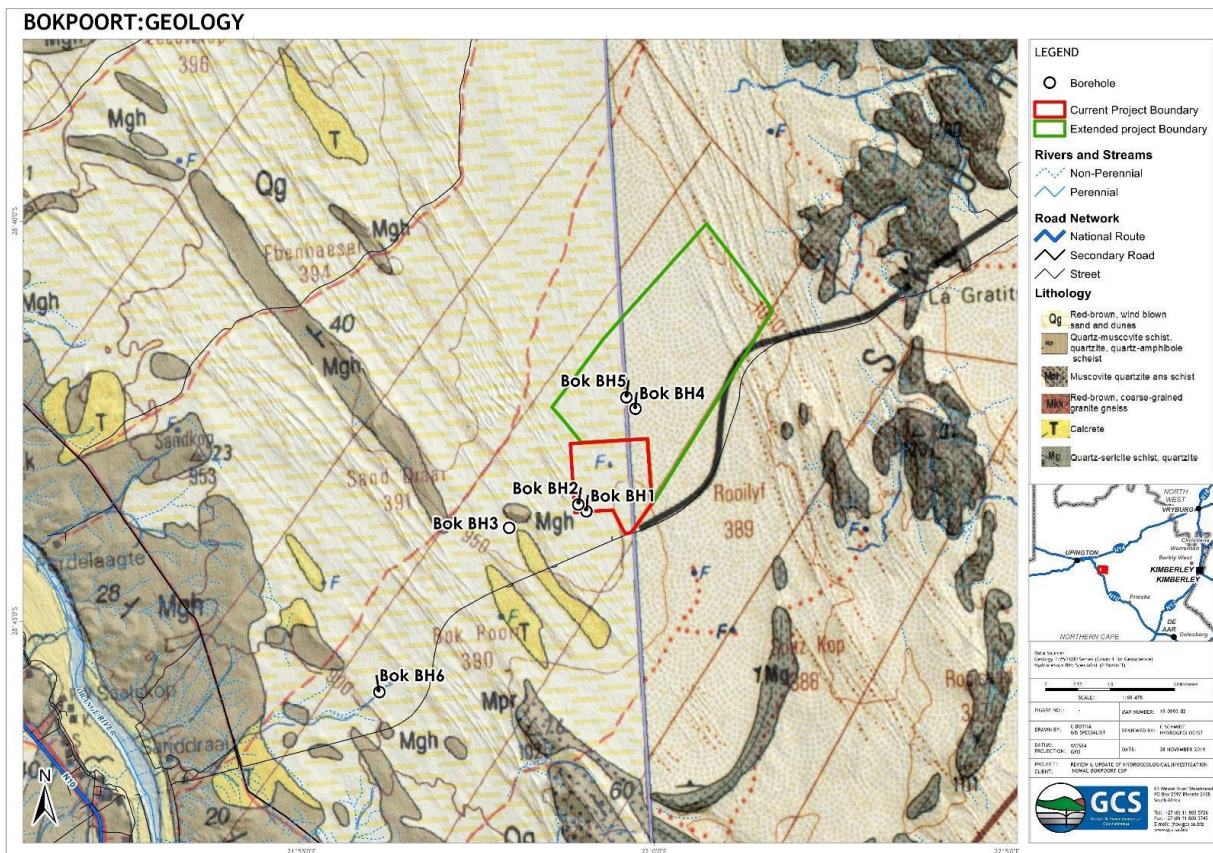


Figure 5-1: Geology map

## 5.2 Meteorological Conditions

### 5.2.1 Rainfall and Water Availability

Rainfall in the project area is scarce and generally occurs in late summer and early autumn between January and April (Figure 5-2). Average rainfall in the area varies between 170 and 240mm per annum (Figure 5-3), while evaporation is extremely high due to the high temperatures, which can reach 35 - 40°C in summer.

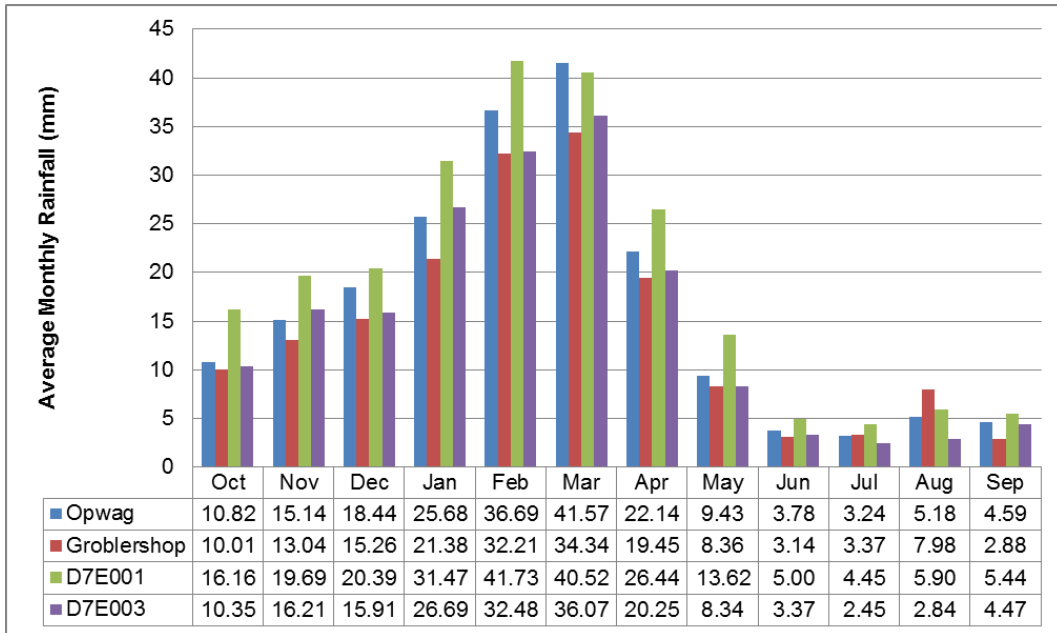


Figure 5-2: Monthly rainfall distribution for rainfall stations in the surrounding area<sup>27</sup>

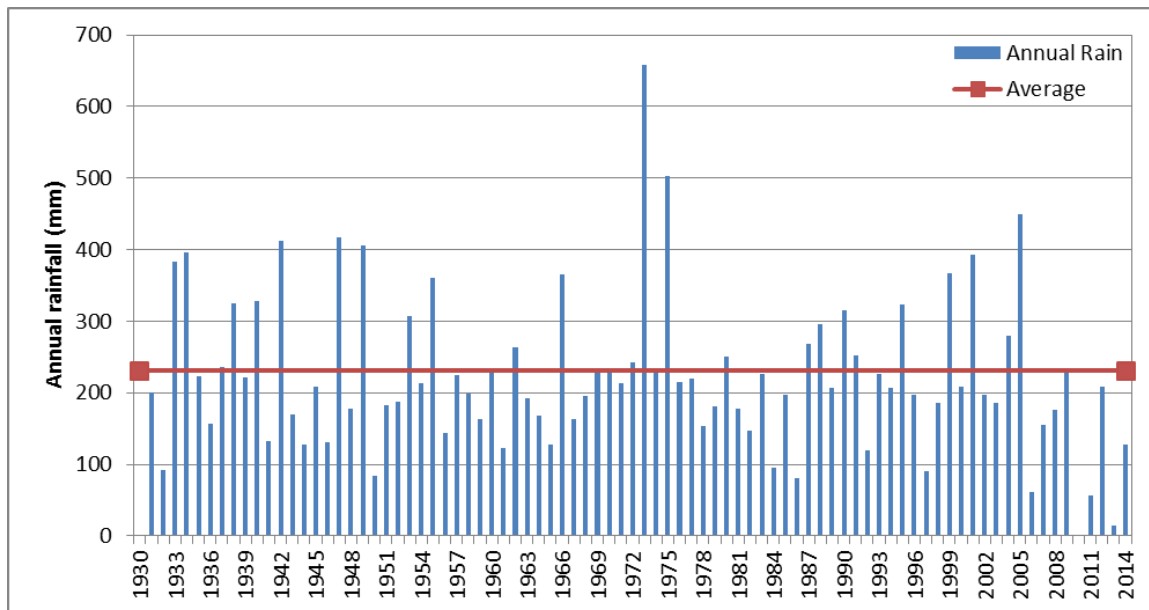


Figure 5-3: Annual rainfall recorded at the D7E001 (Boegoeberg Dam) station<sup>28</sup>

One of the most important climate parameters for agriculture in a South African context is moisture availability, which is the ratio of rainfall to evapotranspiration. Moisture availability is classified into 6 categories across the country (Table 5-1). The site falls into the driest of these six categories (C6), which is labelled as a very severe limitation to agriculture.

<sup>27</sup> Schlechter, M., & Baxter, B. 2016. Final EIA Report: Proposed 150MW CSP Tower Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape. Golder Associates. Ref 14/12/16/3/2/879.

<sup>28</sup> Ibid.

**Table 5-1: The classification of moisture availability climate classes for summer rainfall areas across South Africa\***

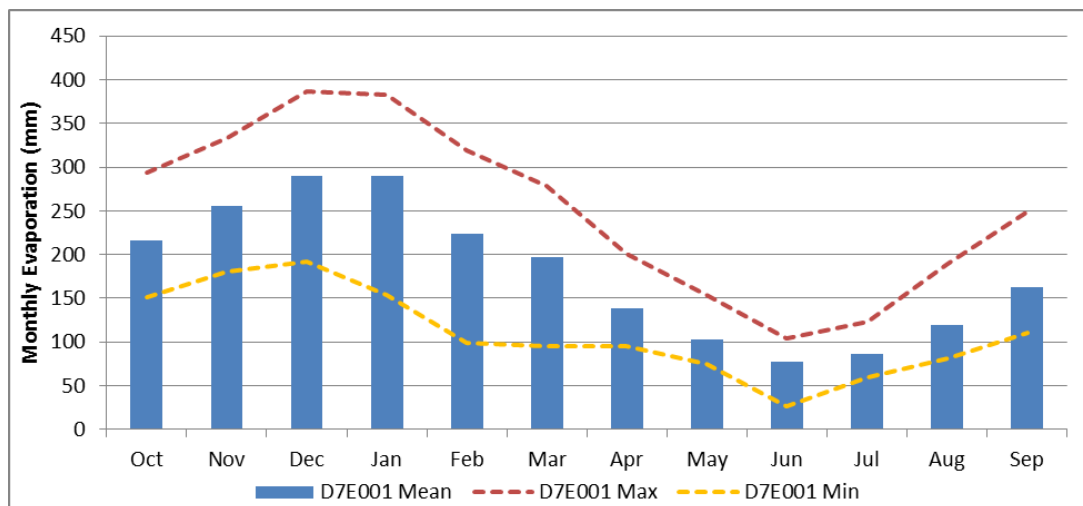
Climate Class	Moisture Availability (Rainfall/ 0.25 PET)	Description of Agricultural Limitation
C1	>34	None to slight
C2	27-34	Slight
C3	19-26	Moderate
C4	12-18	Moderate to severe
C5	6-12	Severe
C6	<6	Very severe

\*Source: Agricultural Research Council

### 5.2.2 Evaporation

Monthly evaporation data was available for the DWS Station D7E001, located approximately 40km south east of the project site. The station has an approximate Mean Annual Evaporation (MAE) of 2166.3mm calculated over a period of 1931 - 2008. Monthly mean, minimum and maximum evaporation depths are shown in Figure 5-4.

The highest evaporation occurs in the summer months of September to March. The average monthly evaporation values are shown in Table 5-2.



**Figure 5-4: Monthly mean, minimum and maximum evaporation for station D7E001 (Boegoeberg Dam)<sup>29</sup>**

<sup>29</sup> Schlechter, M., & Baxter, B. 2016. Final EIA Report: Proposed 150MW CSP Tower Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape. Golder Associates. Ref 14/12/16/3/3/2/879.



**Table 5-2: Average monthly evaporation values for station D7E001<sup>30</sup>**

Month	Monthly Evaporation
October	216
November	255
December	290
January	290
February	223
March	197
June	139
July	103
August	77
September	87
Year	1 877

### 5.2.3 Surface Wind Field

The Water Research and Forecasting (WRF) data for the period 2017 to 2019 was utilised for the assessment. The WRF period wind roses (Figure 5-5) depict the predominance of the north-north-easterly winds with wind speeds greater than 5m/ s, especially during the day. Winds from the north-westerly sector were also predominant during the day, albeit at slightly lower overall wind speed. The night-time wind rose shows a decrease in the northerly and the north-westerly winds and an increase in the easterly and east-south-easterly winds. Night-time was also characterised by an increase in the frequency of calm wind conditions.

Calm conditions were most frequently recorded in summer and most infrequently in winter (Figure 5-6). In summer, west-south-westerly dominance is noted, while in winter north-north-easterly winds were more frequent. Winds in the higher wind speed categories were most common in spring from the north-north-east.

<sup>30</sup> *Ibid.*

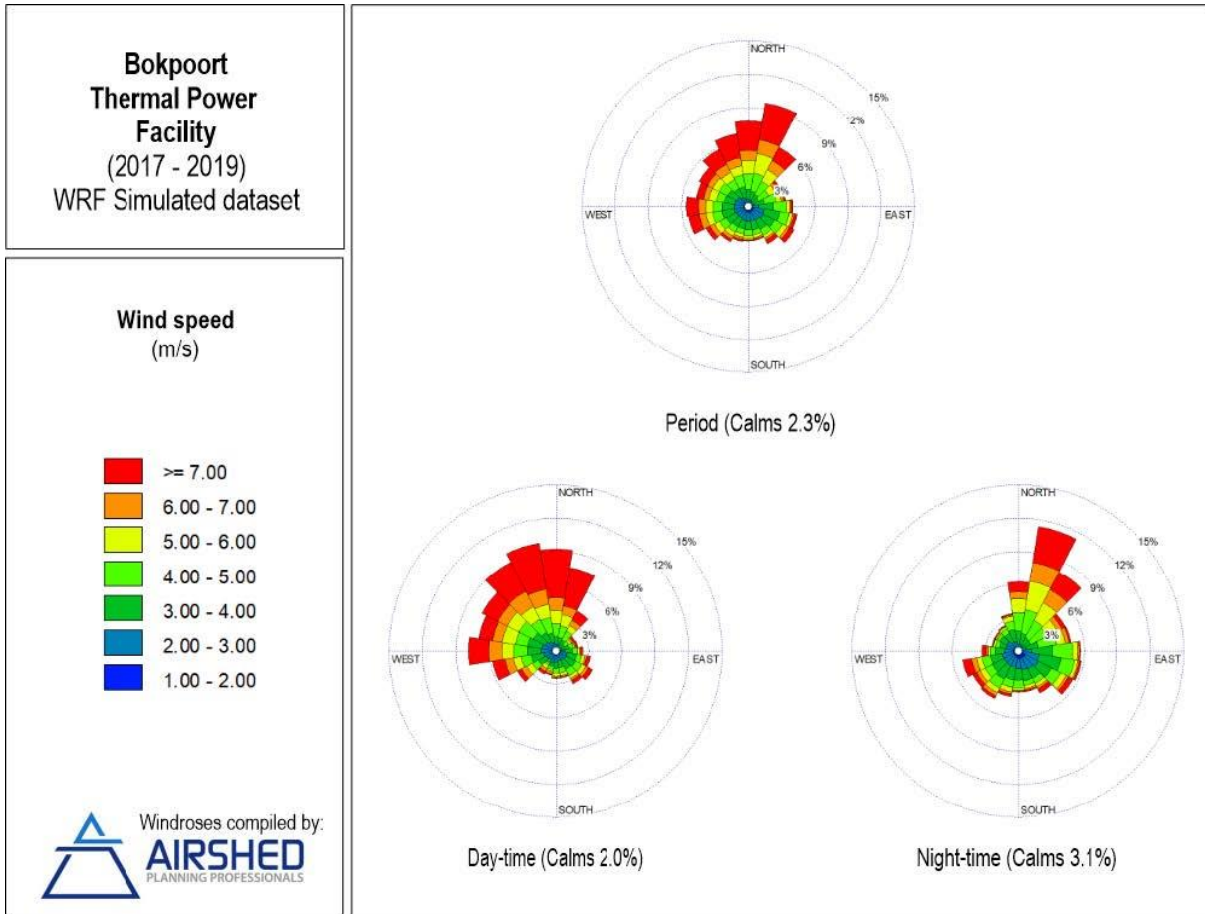


Figure 5-5: Period average, day-time and night-time wind roses (WRF simulated data; 2017 to 2019)

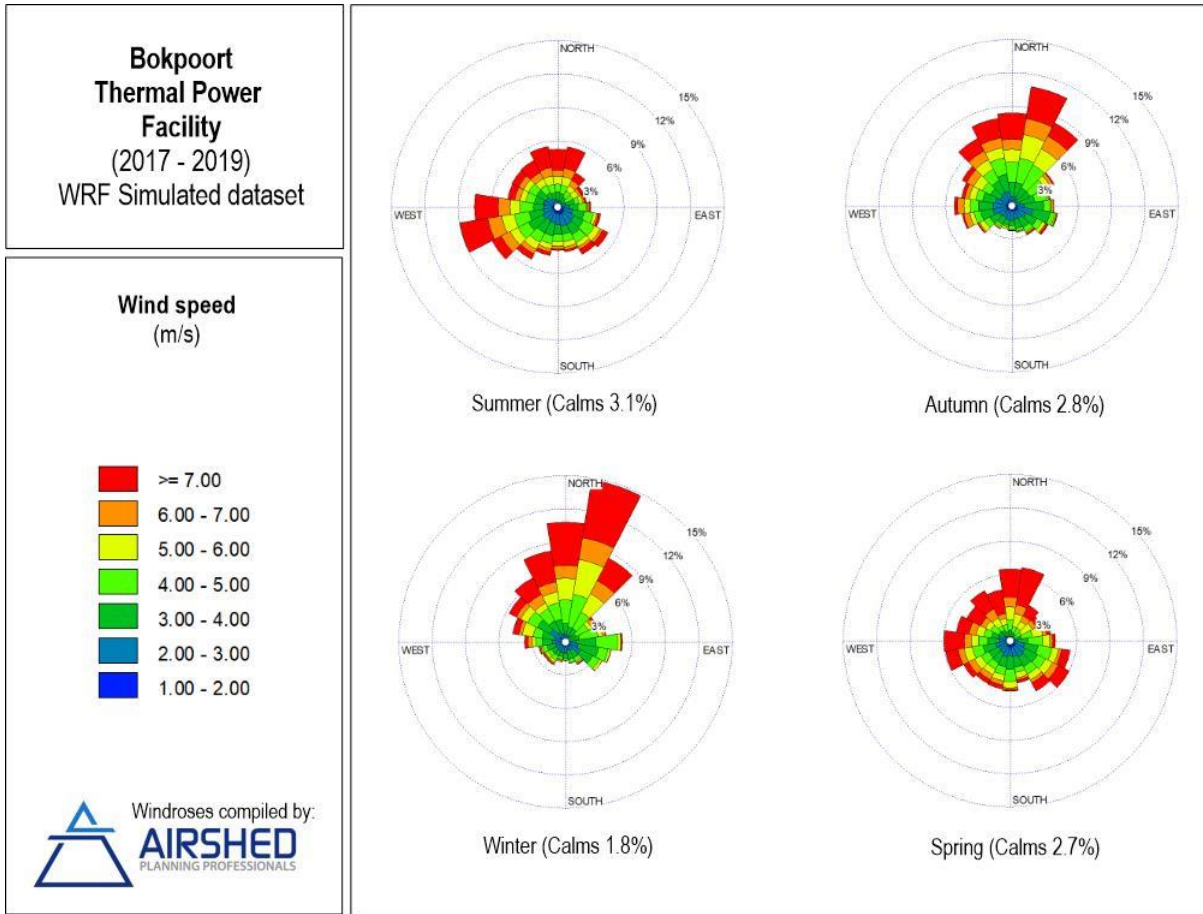


Figure 5-6: Seasonal wind roses (WRF simulated data; 2017 to 2019)

### 5.2.4 Temperature

The monthly temperature patterns from the WRF data are shown in Table 5-3 and Figure 5-7. Average temperatures ranged between 13.1°C and 25.5°C. The highest temperatures occurred in December and the lowest in July. During the day, temperatures increase to reach maximum at around 15:00 in the afternoon. Ambient air temperature decreases to reach a minimum at around 07:00.

Table 5-3: Monthly temperature summary (2017 to 2019)

Hourly Minimum, Hourly Maximum and Monthly Average Temperatures (°C)												
Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	-1.3	-1.8	-2.5	-2.8	-3.1	-3.6	-3.8	-2.5	2.8	4.4	6.4	7.9
Average	17.0	15.2	14.6	14.0	13.5	13.1	14.3	17.0	19.9	22.3	24.0	25.5
Maximum	31.1	28.1	27.0	27.1	27.2	26.7	29.2	32.3	34.2	35.5	36.8	37.6

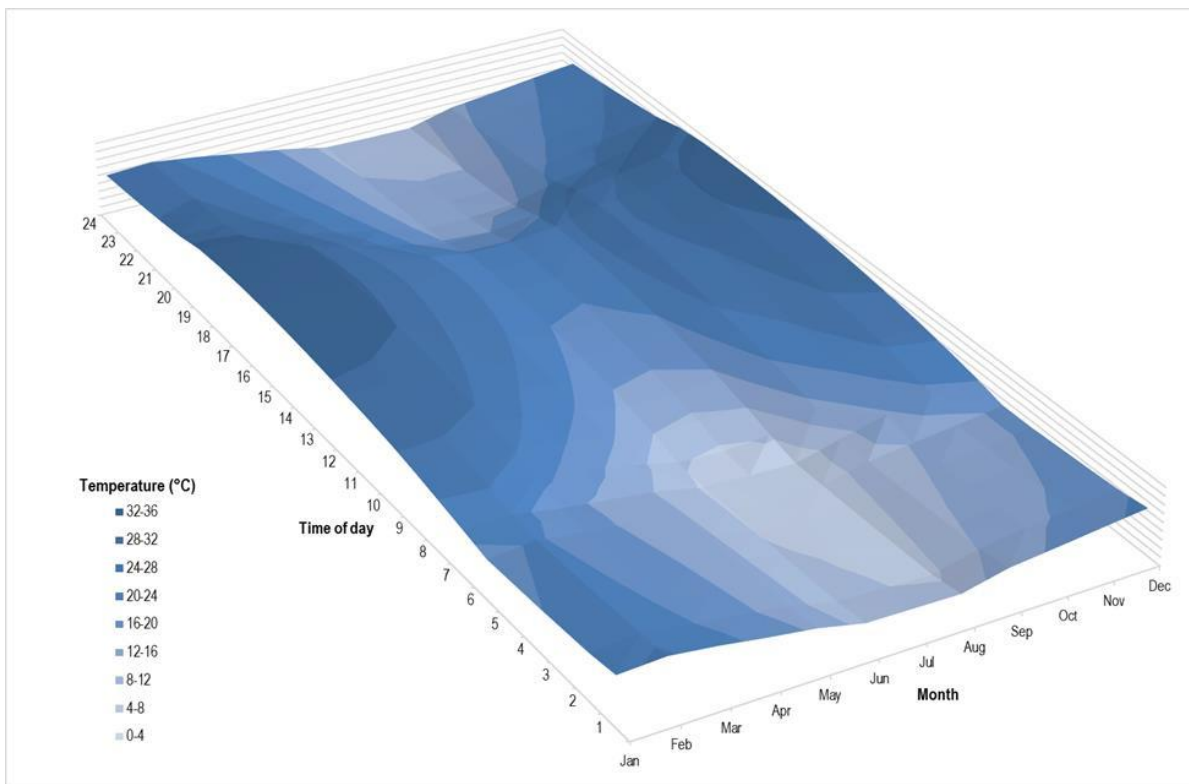
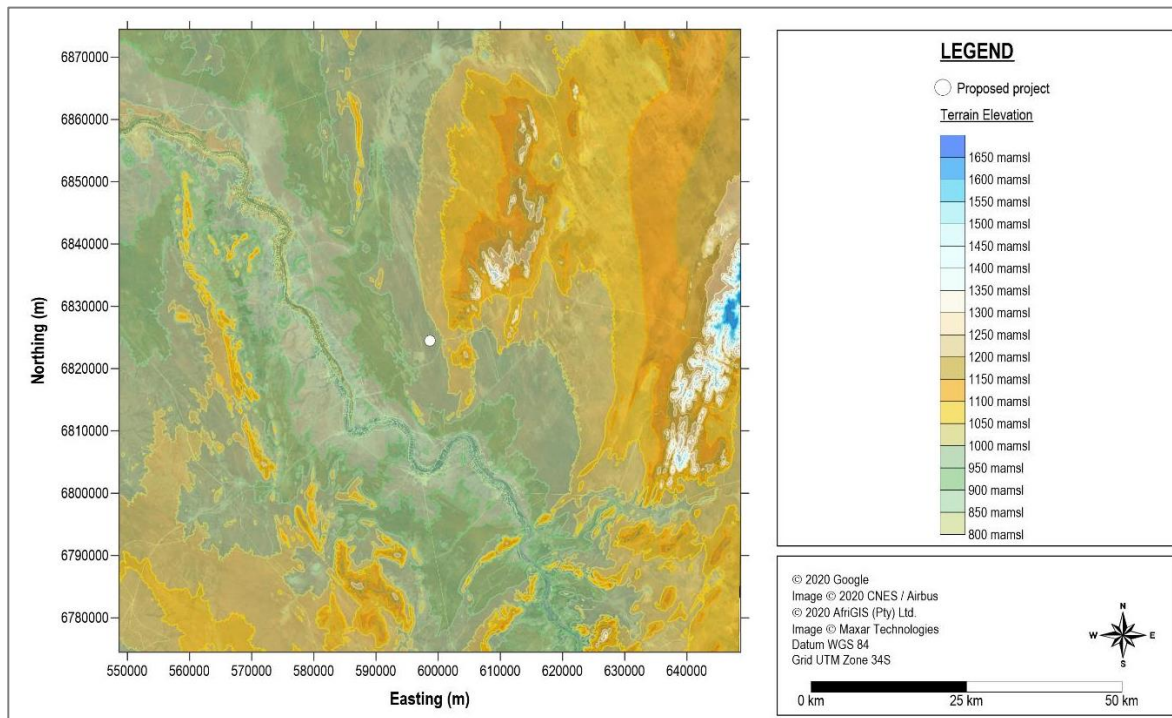


Figure 5-7: Monthly temperature profile (WRF simulated data, 2017 to 2019)

### 5.3 Topography

The regional-scale study area (50km radius) is characterised by terrain elevations in the range 800 and 1650m amsl (Figure 5-8). In closer proximity to the project site, elevations vary between 900 to 1150m amsl with gently undulating terrain with no major topographical features within 10km of the proposed site. The average slope across the study area is less than 10%.



**Figure 5-8: Terrain of the project area**

## 5.4 Soils

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climate conditions into different land types (Figure 5-9). There is predominantly one land type across most of the site, namely Ae4. A small part of the site in the extreme north east is on land type Af7. The soils of Ae4 are shallow to moderately deep, red, sandy soils overlying hard pan carbonate and sometimes rock. These soils fall into the Calcic and Lithic soil groups according to the classification of Fey<sup>31</sup>. Land type Af7 comprises deeper red sands and includes dunes. Soils are predominantly of the Coega soil form, with lesser coverage of shallow Plooyburg form.

The soils are classified as having low to moderate susceptibility to water erosion, and as highly susceptible to wind erosion.

<sup>31</sup> Fey, M. 2010. *Soils of South Africa*. Cambridge University Press, Cape Town.

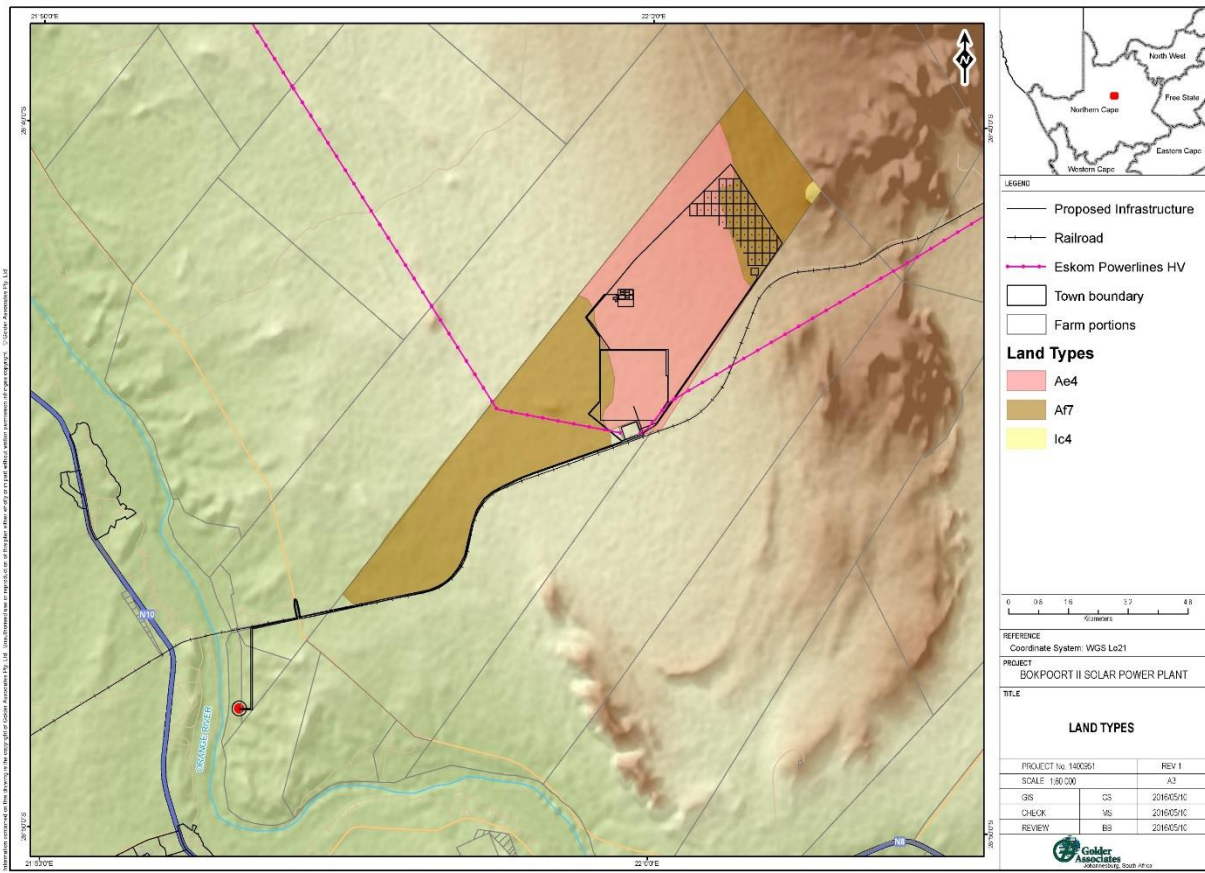


Figure 5-9: Land types<sup>32</sup>

## 5.5 Agricultural Capability

The project area is classified with a predominant land capability evaluation value of 5 (Low), although it varies from 3 (Very Low to Low) to 5 (Low) across the site (Table 5-4). Agricultural limitations that result in the low land capability classification are predominantly due to the very limited climatic moisture availability. The very sandy soils, with very limited water holding capacity are a further limitation. These factors render the site unsuitable for any kind of mainstream cultivation without irrigation and limit it to low density grazing only.

Table 5-4: Details of the 2017 Land Capability classification for South Africa

Land capability evaluation value	Description
1	Very Low
2	
3	Very Low to Low
4	
5	Low
6	Low to Moderate
7	
8	Moderate

<sup>32</sup> Schlechter, M., & Baxter, B. 2016. Final EIA Report: Proposed 75MW Photovoltaic (PV2) Solar Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape. Golder Associates. Ref 14/12/16/3/3/2/880.

Land capability evaluation value	Description
9	Moderate to High
10	
11	High
12	High to Very High
13	
14	Very High
15	

The long-term grazing capacity of the site is fairly low at 22 hectares per large stock unit.

## 5.6 Surface Water

Apart from the Orange River, which is a large regional river, drainage is largely limited to the wider Orange River valley, especially in the areas to the north and east of the river (in which the study area is located). Drainage only occurs within an area of about 4.5km of the river channel, an area which is largely characterised by rugged, incised topography. Beyond this corridor no or very limited drainage occurs. Limited surface water drainage occurs in areas characterised by higher-lying, rockier terrain, such as the mountainous terrain (Skurweberg Hills) located to the east and north-east of the site.

The 1:50000 scale topo-cadastral maps indicate that there are no drainage or surface water features on the development site. A site visit for the previous earlier assessments confirmed that no surface water features are located on the site of the proposed development. Of the two primary landforms located on the development site, the calcrete gravel plains are extremely flat, with no linear surface water drainage features present. Pans can occur in such very flat terrain where no linear drainage occurs, but there are no pans that occur on the site.

The closest surface water features to the development site are located 900m – 1km to the east and north-east of the Bokpoort farm's north-eastern boundary where the underlying geology changes and a concomitant change in topography from Duneveld to rocky hills is encountered.

## 5.7 Ecology

The study area falls within the Bushmanland Bioregion of the Nama-Karoo Biome and on the edge of the Kalahari Duneveld Bioregion of the Savanna Biome<sup>33</sup>. According to the vegetation classification of Mucina & Rutherford<sup>34</sup>, BGIS vegetation map updated 2018), there are two vegetation types present within the development footprint i.e. Kalahari Karroid Shrubland and Gordonia Duneveld (Figure 5-10).

Gordonia Duneveld typically occurs on the undulating dunes. It is an open shrubland with grasslands on the ridges and Grey Camel Thorn, *Vachellia haematoxylon* (formerly known as *Acacia haematoxylon*) on the dunes slopes, *Senegalia mellifera* is prominent on the lowers slopes and Three thorn, *Rhigozum trichotomum* is found in the interdune streets. The Gordonia Duneveld is listed as Least Concern<sup>35</sup>. It is considered to be moderately protected with 14.8% formally conserved, in the Kgalagadi Transfrontier Park.

The Kalahari Karroid Shrubland typically forms belts alternating with belts of Gordonia Duneveld, it is characterised by low karroid shrubland on flat gravel plains. The Kalahari Karroid Shrubland is listed as

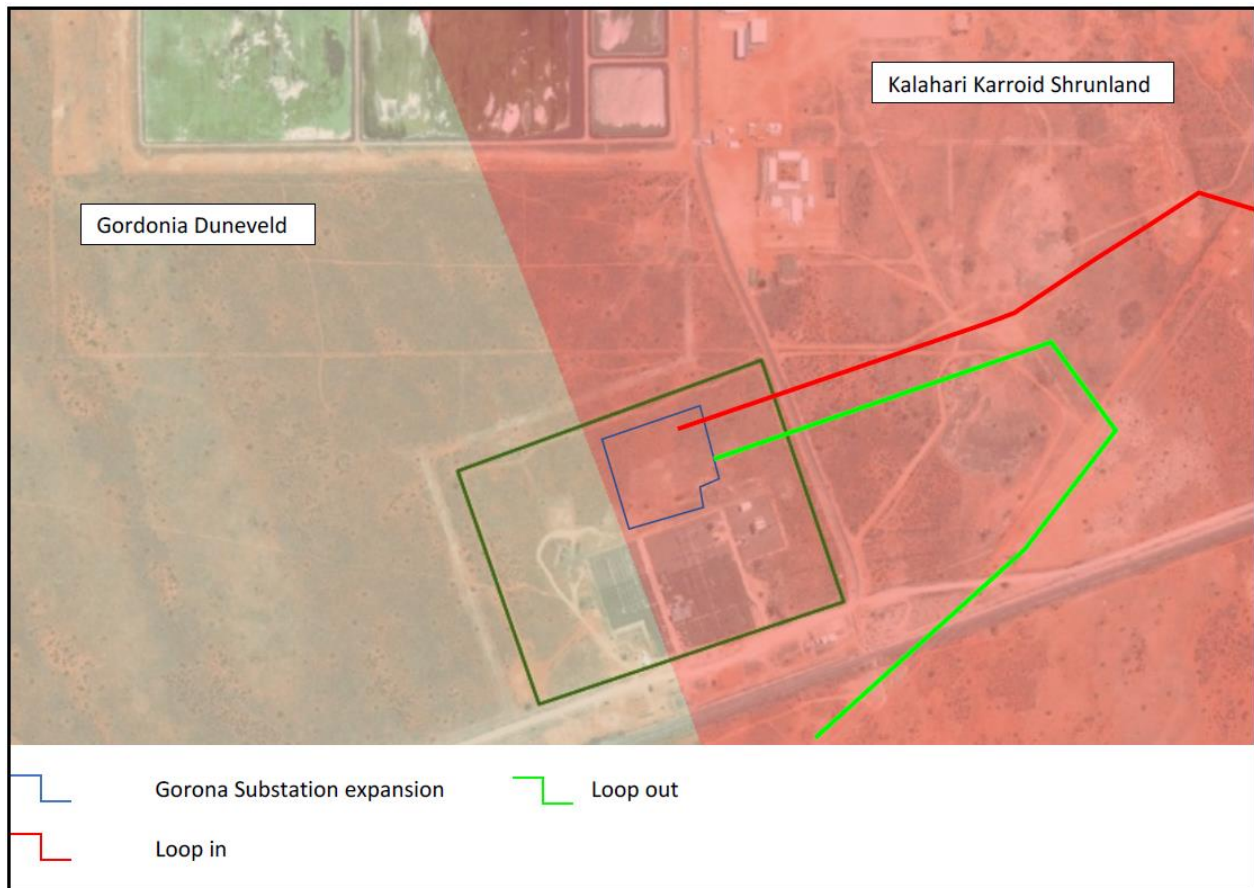
<sup>33</sup> Mucina, L. and Rutherford, M.C. (eds) 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute, Pretoria

<sup>34</sup> *Ibid.*

<sup>35</sup> National Biodiversity Assessment. 2018: *The status of South Africa's Ecosystems and Biodiversity. Synthesis Report*. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria.

Least Concerned according to the National Biodiversity Assessment<sup>36</sup>. It is not well conserved, with only a small amount (0.1%) formally conserved within the Augrabies National Park.

The western section of the substation area falls within the Gordonia Duneveld while the eastern section where the planned expansion and the 400kV LIL0 will be positioned falls within the Kalahari Karroid Shrubland.



**Figure 5-10: Broad-scale vegetation types within the proposed development area**

### 5.7.1 Plant Community Description

Within the greater area, calcareous low shrub plains and open shrub plains occur (Photograph 1). The calcareous low shrub plains are characterised by low shrubs and grasses, the underlying soils consist of whitish calcareous and compact sandy soils that are grey-brown in colour. Prominent species include the grasses *Enneapogon desvauxii*, *Eragrostis obtusa*, *Eragrostis truncata*, *Fingerhuthia africana*, *Stipagrostis ciliata*, the shrub *Salsola etoshensis* and the forbs *Pentzia calcarea*, *Eriocephalus spinescens*, *Monechma genistifolium* subsp. *australe*, *Geigeria* sp. *Boscia albitrunca* is one of the few tall shrubs within this vegetation unit.

Open shrub plains typically consist of shrubs and scattered trees on sandy, red soils with a well-developed herbaceous layer. The species diversity is relatively low, and includes taller woody species such as *Senegalia mellifera*, *Parkinsonia africana*, *Grewia flava* and *Boscia albitrunca*. Scattered individuals of

<sup>36</sup> National Biodiversity Assessment. 2018: The status of South Africa's Ecosystems and Biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria.



*Vachellia erioloba* are also present within the landscape. Low shrubs include *Lebeckia linearifolia*, *Lycium bosciifolium*, *Rhigozum trichotomum* and *Salsola etoshensis*. Conspicuous grass species include *Schmidtia kalahariensis*, *Eragrostis lehmanniana* and *Stipagrostis ciliata*.

The majority of the proposed development footprint consists of open shrub plains. Much of the proposed development area has some form of disturbance in it, such as roads, fence infrastructure, and is already highly fragmented.

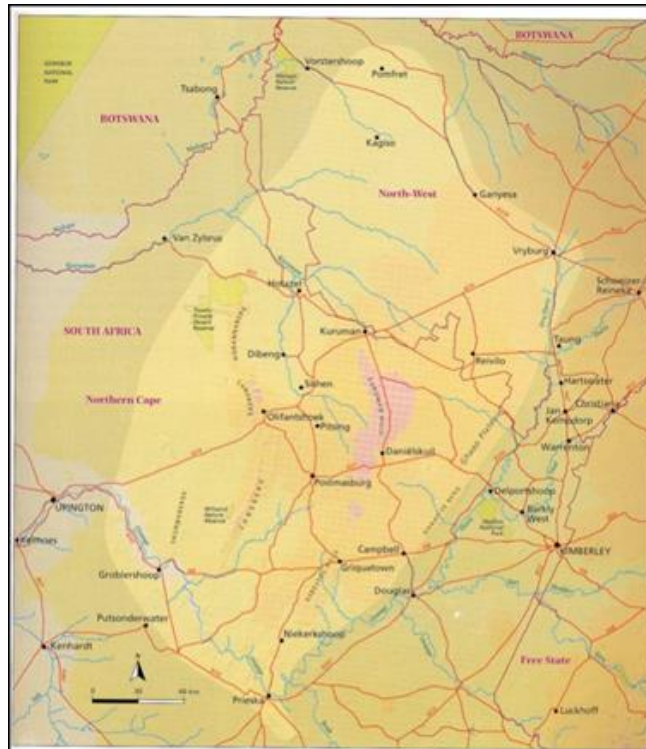


**Photograph 1: Examples of the calcareous low shrub (left) and open shrub plains (right)**

### **5.7.2 Critical Biodiversity Areas and Broad-Scale Processes**

The study area falls within the Griqualand West Centre of Endemism (GWC)<sup>37</sup> - Figure 5-11. A centre of plant endemism is an area with high concentrations of plant species with very restricted distributions, known as endemics. Centres of endemism are important because it is these areas, which if conserved, would safeguard the greatest number of plant species. They are extremely vulnerable; relatively small disturbances in a centre of endemism may easily pose a serious threat to its many range-restricted species. The GWC is one of the 84 African centers of endemism and one of 14 centers in southern Africa, and these centers are of global conservation significance. The GWC is considered a priority in the Northern Cape, as the number of threats to the area is increasing rapidly and it has been little researched and is poorly understood. Furthermore, this center of endemism is extremely poorly conserved, and is a national conservation priority.

<sup>37</sup> Van Wyk, A.E. & Smith, G.F. 2001. *Regions of floristic endemism in southern Africa*. Umdaus press, Hatfield



**Figure 5-11: The extent of the Griqualand West Centre of Endemism**

The study area does not overlap with any Important Bird Areas, protected area or Critical Biodiversity Area (CBA). In addition, the site is homogeneous and there are no unique or rare habitats or ecosystems within or in close proximity to the site.

### **5.7.3 Populations of Sensitive and/ or Threatened Floral and Faunal Species**

Much of the proposed development footprint has already been disturbed by the existing substation infrastructure, roads and fences which has resulted in disturbance to the floral and faunal population on site. Disturbances that alter the natural environment have two effects namely, it may cause the loss of certain species due to the destruction of habitat. It may also cause the influx of other species previously unable to colonise an area owing to lack of suitable habitat or because they have been excluded through competition.

There are however a number of species of special concern that have been noted to occur in the area immediately surrounding the proposed development area and these have been noted for the purposes of this report.

#### **5.7.3.1 Floral Species of Conservation**

A number of botanical surveys conducted in the area have identified a number of plant Species of Conservation Concern (SCC) these are listed in Table 5-5. No critically endangered, endangered, vulnerable, near threatened, critically rare, rare or declining plant species have been recorded, although two species have been categorised as Data Deficient - Taxonomically Problematic (DDT).

**Table 5-5: Summary of the floral species of conservation concern that may occur on site or in the adjacent area**

Species	Legislation	Conservation Status	Potential of Occurrence within and around Proposed Development Area
<i>Vachellia erioloba</i>	National Forests Act (1998)	Protected (Least Concern - LC)	<b>High</b> suitable habitat
<i>Vachellia haematoxylon</i>	National Forests Act (1998)	Protected (LC)	<b>High</b> suitable habitat
<i>Boscia albitrunca</i>	NCNCA (2004)	Protected (LC) Schedule 2	<b>High</b> suitable habitat
<i>Aloe claviflora</i>	NCNCA (2004)	Schedule 2 (LC)	<b>Moderate</b> limited suitable habitat
<i>Acanthopsis hoffmannseggiana</i>	NA	DDT	<b>Moderate</b> limited suitable habitat
<i>Euphorbia davyi</i>	NCNCA (2004)	Schedule 2 (LC)	<b>Moderate</b> limited suitable habitat
<i>Hoodia gordonii</i>	NCNCA (2004) Threatened or Protected Species (TOPS)	Schedule 1 Schedule 1B (DDT)	<b>High</b> suitable habitat
<i>Hoodia gordonii</i>	NCNCA (2004) TOPS	Schedule 1 Schedule 1B (DDT)	<b>High</b> suitable habitat
<i>Ruschia divaricata</i>	NCNCA 2004	Schedule 2 (LC)	<b>Moderate</b> limited suitable habitat

### 5.7.3.2 Reptiles Species of Conservation Concern

No critically endangered, endangered, vulnerable, near threatened, critically rare, rare or declining terrapin, tortoises, snakes or lizards were identified as occurring in the quarter degree square 2821DB, based on the distribution maps available in the South African Red Data Book for reptiles and The Southern African Reptile Conservation Assessment (SARCA). The conservation status was cross checked on the South African National Biodiversity Institute (SANBI) and the International Union for Conservation of Nature (IUCN) websites to determine most recent status listing for these species. Some of the reptiles that have been recorded in the area are protected under the NCNCA schedule 1 & 2, these are listed in Table 5-6. The *Agama atra* (Southern Rock Agama) was noted during the faunal surveys, this species is classified as Near endemic, although it is not listed as protected.

**Table 5-6: Summary of the reptile species that are protected under the NCNCA**

Species	Common Name	Status	Permit Applicable Legislation
<i>Pedioplanis lineocellata</i>	Spotted Sand Lizard	LC Protected	NCNCA Schedule 2
<i>Psammobates oculifer</i>	Serrated Tent Tortoise	LC Protected	NCNCA Schedule 2
<i>Pedioplanis inornata</i>	Plain Sand Lizard	LC Protected	NCNCA Schedule 2
<i>Varanus albigularis albigularis</i>	Rock Monitor	LC Protected	NCNCA Schedule 2

### 5.7.3.3 Amphibians of Conservation Concern

No critically endangered, endangered, vulnerable, near threatened, critically rare, rare or declining amphibians were identified as occurring in the quarter degree square 2821DB, based on the distribution maps available in the South African Red Data Book for amphibians and the South African Frog Atlas project. No amphibians have been confirmed to occur in or around the site.

#### 5.7.3.4 Mammals of Conservation Concern

A list of all red data mammal species occurring in the quarter degree square, was extrapolated from the Red Data Book for Mammals and the MammalMAP, the Mammal Atlas of Africa database. Based on an evaluation of the habitat requirements, the potential of these critically endangered, endangered, vulnerable, near threatened, critically rare, rare or declining species to occur either on-site or within 500m of the property boundary is provided in Table 5-7.

**Table 5-7: Mammal species of conservation concern identified as occurring in the quarter degree square and the potential for occurrence on the proposed site**

Common Name	Scientific Name	Conservation Status	Suitable Habitat On-Site	Potential for Occurrence in Area Surrounding the Development Site
<b>Dent's Horseshoe Bat</b>	<i>Rhinolophus denti</i>	Near Threatened	<b>Limited</b> Requires substantial cover such as caves and rock crevices	<b>Low</b> As the landscape in the immediate area is flat and does not offer suitable roosting habitat for this species, it is unlikely that this species would have colonised the adjacent areas
<b>Pangolin</b>	<i>Smutsia temminckii</i>	Vulnerable (protected TOPS)	<b>Moderate</b> Some suitable habitat in surrounding areas	<b>Low</b> Unlikely to occur within the immediate surrounds of the site
<b>Brown Hyaena</b>	<i>Parahyaena brunnea</i>	Near Threatened (protected TOPS)	<b>Moderate</b> Suitable habitat but a lot of disturbance in the area	<b>Low</b> Unlikely to occur within the immediate surrounds of the site but may traverse the greater area
<b>Cape Clawless Otter</b>	<i>Aonyx capensis</i>	Near Threatened (protected TOPS)	<b>None</b> No suitable habitat on site or within the immediate surrounds	<b>Low</b> Site is too far removed from the river area

There are a number of mammals that have a conservation status of least concern which are protected under TOPS and/ or the NCNCA that have been confirmed to occur in or around the site, these are listed in Table 5-8.

**Table 5-8: Summary of the mammal species that are protected under the NCNCA**

Species	Common Name	Status	Permit Applicable Legislation
<i>Otocyon megalotis</i>	Bat-eared Fox	LC Protected	NCNCA Schedule 1
<i>Cynictis penicillata</i>	Yellow Mongoose	LC Protected	NCNCA Schedule 2
<i>Galerella sanguinea</i>	Slender Mongoose	LC Protected	NCNCA Schedule 2
<i>Lepus capensis</i>	Cape Hare	LC Protected	NCNCA schedule 2
<i>Lepus saxatilis</i>	Scrub Hare	LC Protected	NCNCA Schedule 2

Species	Common Name	Status	Permit Applicable Legislation
<i>Ictonyx striatus</i>	Striped Polecat	LC Protected	NCNCA Schedule 1
<i>Mellivora capensis</i>	Honey Badger	LC Protected	NCNCA Schedule 1 & TOPS
<i>Orycteropus afer</i>	Aardvark	LC Protected	NCNCA Schedule 1

### 5.7.3.5 Invertebrates of Conservation Concern

No invertebrate SCC were recorded on or around the site during previous biodiversity surveys, although two species *Alfredectes browni* (Browns Shieldback) and *Lepidochrysops penningtoni* (Pennington's Blue) are noted as possibly occurring in the area. Both these species are listed as Data Deficient.

### 5.7.4 Alien Invasive Species

The Conservation of Agricultural Resources Act (CARA) regulates and restricts the propagation, harbouring and sale of alien invasive plant and weed species listed in a set of Regulations published in terms of the Act. CARA was amended in 2001 and is administered by the National Department of Agriculture, Land Reform and Rural Development.

The National Environmental Management: Biodiversity Act (NEMBA – Act No. 10 of 2004) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. All listed invasive alien plants are divided into four categories in accordance with the Government Gazette Notice No. 40166 of July 2016 as listed below:

- Category 1a (Prohibited): Listed Invasive Species;
- Category 1b (Prohibited/ Exempted if in Possession or Under control);
- Category 2 (Permit Required): Listed Invasive Species; and
- Category 3 (Prohibited): Listed Invasive Species.

**Table 5-9: Alien invasive species that occur in the area**

Species		Category
<i>Argemone mexicana</i>	Yellow flowered Mexican Poppy	1b
<i>Prosopis cf. glandulosa</i>	Mesquite	3
<i>Datura ferox</i>	Fierce Thorn apple	1
<i>Xanthium spinosum</i>	Spiny cocklebur	1b
<i>Salsola kali</i>	Tumbleweed	1b

## 5.8 Avifauna

### 5.8.1 Bird Microhabitats

The micro-habitats include scattered kraals, reservoirs and associated water troughs for livestock farming, thornveld/ scrubland, open grassy scrubland, gravel plains, and duneveld.

#### 5.8.1.1 Birds of Conservation Concern

A list of all birds of conservation occurring in the quarter degree square 2821DB, was extracted from the South African Bird Atlas Project (SABAP) 1 and SABAP 2 databases and Birdlife South Africa's Important

Bird Areas and from the Red Data Book of Birds<sup>38</sup> with the distribution being confirmed in Roberts – Birds of Southern Africa, 7th edition. The IUCN status (2021-1) is also presented in Table 5-10. Based on an evaluation of the habitat requirements, the potential of these critically endangered, endangered, vulnerable, near threatened, critically rare, rare or declining species to occur either on-site or within 500m of the property boundary is provided in Table 5-10. The development footprint does not constitute critical habitat for any of the bird SCC, nor are they directly dependent on the proposed development footprint with respect to foraging or nesting.

**Table 5-10: Bird species of conservation concern identified as occurring in the quarter degree square and the potential for occurrence on the proposed site**

Common Name	Scientific Name	Conservation Status (Regional, Global)	Suitable Habitat Requirements <sup>39</sup>	Potential for Occurrence in area Surrounding Development Site
<b>Martial Eagle</b>	<i>Polemaetus bellicosus</i>	Endangered <i>Endangered</i>	Woodland, savannah or grassland with clumps of large trees or power pylons for nest sites	<b>High</b> Sufficient habitat in surrounding areas
<b>Secretarybird</b>	<i>Sagittarius serpentarius</i>	Vulnerable <i>Endangered</i>	Requires open grassland with scattered trees, shrubland, open Mixed Savannah	<b>Medium</b> Patches of open savannah will accommodate this species in surrounding area
<b>Kori Bustard</b>	<i>Ardeotis kori</i>	Near Threatened <i>Near Threatened</i>	Dry thornveld grassland, arid scrub requires the cover of some trees	<b>Medium</b> Moderate to high shrub density throughout the surrounding area
<b>Black Stork</b>	<i>Ciconia bigra</i>	Vulnerable <i>Least Concern</i>	Marshes, dams' rivers and Estuaries breed in mountainous regions	<b>Low</b> No suitable habitat in surrounding area
<b>Lappetfaced Vulture</b>	<i>Torgos tracheliotos</i>	Endangered <i>Endangered</i>	Savannah: semi-arid regions closely associated with <i>Vachellia</i> spp, <i>Bosica albitrunca</i> and <i>Terminalia pruniodes</i>	<b>High</b> Suitable habitat in surrounding areas
<b>Ludwig's Bustard</b>	<i>Neotis ludwigii</i>	Endangered <i>Endangered</i>	Requires semi-arid dwarf shrublands, occasionally visiting the southern Kalahari	<b>High</b> Sufficient habitat in surrounding areas

<sup>38</sup> Taylor, M., Peacock F., Wanless R M 2015. The 2015 Eskom Red Data Book of Birds. BirdLife South Africa

<sup>39</sup> Habitat requirements determined using the following reference material: Harrison et al., 1997a. Harrison et al., 1997b; Hockey et al., 2005

Common Name	Scientific Name	Conservation Status (Regional, Global)	Suitable Habitat Requirements <sup>39</sup>	Potential for Occurrence in area Surrounding Development Site
<b>Lanner Falcon</b>	<i>Falco biarmicus</i>	Vulnerable <i>Least Concern</i>	Lanner Falcons are generally a cliff nesting bird, but have adapted to using the disused nests of Black and Pied crows, situated either in trees or on powerlines for foraging purposes, Lanner Falcons utilise a wide range of habitats, from semi desert to woodland, agricultural land and also occurs in cities, but appear to prefer open habitats	<b>High</b> Sufficient habitat in surrounding areas
<b>Verreaux's Eagle</b>	<i>Aquila verreauxii</i>	Vulnerable <i>Least Concern</i>	Verreaux's Eagle is a solitary nester that builds a massive stick structure on a rocky outcrop or cliff, or more rarely in a tree or on a power pylon	<b>High</b> – Has been recorded northeast of the site
<b>Abdim's Stork</b>	<i>Ciconia abdimii</i>	Near Threatened <i>Least Concern</i>	Abdim's Stork is normally found in grasslands, sparsely wooded savannah, near pans and in cultivated fields	<b>Medium-</b> limited suitable habitat in area surrounding site

The previous Avifaunal Assessment conducted for the 10 PV plants project noted the presence of nesting sites for the Verreaux's Eagle and the Martial Eagle, Figure 5-12, the 250m buffer for the Martial Eagle nest is located approximately 2.50km from the 400kV LILO powerline and will not impact the nesting site.

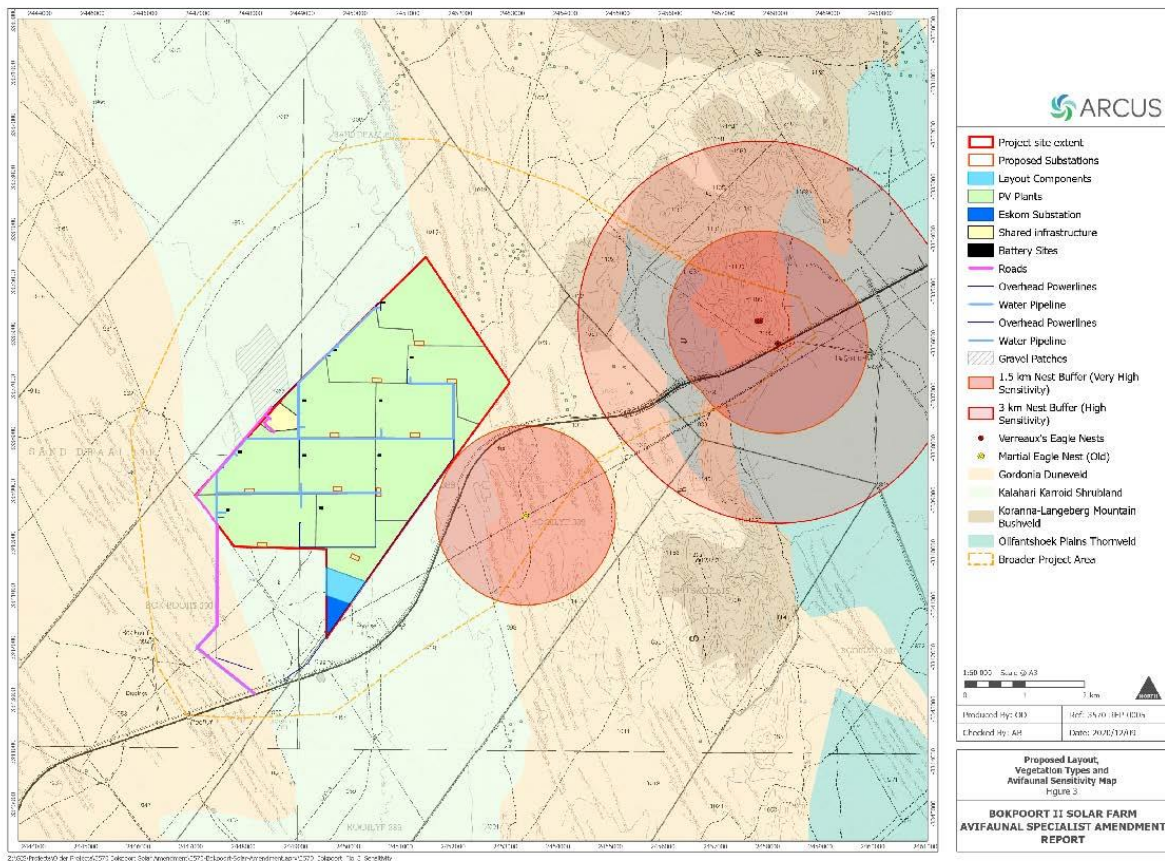


Figure 5-12: Locations of three Verreaux’s Eagle and one Martial Eagle nests

## 5.9 Heritage

### 5.9.1 Stone Age

Surveys in the area has revealed that the archaeological record in the larger region is temporarily confined to the Early and Middle Stone Age, with a smaller occurrence dating to the Later Stone Age. It is spatially concentrated around the rims of pans, the banks of stream and rivers, but also in the vicinity of raw material resources.

No sites, features or objects of cultural significance dating to the Stone Age were identified in the project area.

### 5.9.2 Iron Age

Early Iron Age occupation did not take place in the region and seems as if the earliest Bantu-language speakers to have settled in the larger region were those of Tswana-speaking origin (Tlhaping and Tlharo) that settled mostly to the north and a bit to the west of Kuruman. However, they continued spreading westward and by the late 18<sup>th</sup> century some groups occupied the Langeberg region. With the annexation of the Tswana areas by the British in 1885, the area became known as British Betchuana Land. A number of reserves were set up for these people to stay in. In 1895, the Tswana-speakers rose up in resistance to the



British authority as represented by the government of the Cape Colony. They were quickly subjected, and their land was taken away, divided up into farms and given out to white farmers to settle on (Snyman 1986)<sup>40</sup>.

In his study on the spread of the Iron Age into the Northern Cape, Humphreys (1976)<sup>41</sup> used not only archaeological evidence, literary sources and eyewitness accounts, but also environmental factors such as rainfall data and vegetation cover. From this he concluded that it was not an environment conducive for keeping large herds of cattle, which was the mainstay of Iron Age communities' economy. He even indicates that the occupation of these people contracted from 1700 south of Postmasburg to just south of Kuruman by 1800, indicating a huge change in environmental factors.

Although some researchers would want to identify isolated, undecorated pieces of pottery found in the vicinity of Douglas as of Late Iron Age origin, this is doubtful as they also do not consider the possibility of it being of Khoi origin. Or, alternatively, of very recent origin, i.e. brought into the region by people working as labourers on the various diamond diggings in the larger region.

No sites, features or objects of cultural significance dating to the Iron Age were identified in the study area.

### 5.9.3 Historic Period

It was only during the last part of the 19<sup>th</sup> century, early part of the 20<sup>th</sup> century when population numbers in the region increased. This was the result of intensive irrigation farming that developed along the Orange River.

Groblershoop developed as a result of development of the Boegoeberg Dam and water channels in 1929, which gave rise to grapes and wine production. During the Rebellion of 1914, a number of skirmishes were fought in the region.

No sites, features or objects of cultural significance dating to the historic period were identified in the project area.

## 5.10 Palaeontology

The Precambrian metamorphic and igneous basement rocks of the Namaqua-Natal Metamorphic Province in the study area are entirely unfossiliferous<sup>42</sup> and therefore not assessed further.

Late Caenozoic calcretes of the Kalahari Group may contain trace fossils such as rhizoliths, termite and other insect burrows, or even mammalian trackways. Mammalian bones, teeth and horn cores (also tortoise remains, and fish, amphibian or even crocodiles in wetter depositional settings) may be occasionally expected within Kalahari Group sediments and calcretes, notably those associated with ancient alluvial gravels and pans<sup>43</sup>. However, these fossil assemblages are generally sparse, low in diversity, and occur over a wide geographic area, so the palaeontological sensitivity of the calcretes within the study region is rated as low. This applies equally to the thin veneer of other surface deposits (rocky scree, stream alluvium etc) within this highly arid region.

<sup>40</sup> Snyman, P.H.R. 1986. *Die Langeberg-rebellie en die totstandkoming van Olifantshoek*. *Contree* 20:16-26.

<sup>41</sup> Humphreys, A.J.B. 1976. *Note on the southern limits of Iron Age settlement in the Northern Cape*. *South African Archaeological Bulletin* 31(121/122):54-57

<sup>42</sup> Almond, J.E. and Pether, J. 2008. *Palaeontological heritage of the Northern Cape*. *Interim SAHRA technical report*, 124 pp. *Natura Viva cc, Cape Town*.

<sup>43</sup> Almond, J.E. 2008. *Fossil record of the Loeriesfontein sheet area (1: 250 000 geological sheet 3018)*. *Unpublished report for the Council for Geoscience, Pretoria*, 32 pp. *Natura Viva cc, Cape Town*.

Alluvial gravels of the Orange River of Miocene and younger age are locally highly fossiliferous<sup>44 45 46 47</sup> and extensive references therein) but these are not mapped within the study area. Younger silty alluvial deposits may contain a range of terrestrial and freshwater fossils and subfossils. Freshwater snails are mentioned in particular by Moen<sup>48</sup>. Stream gravels close to the west bank of the Orange River in the Groblershoop area were examined without success for palaeontological remains by Almond in 2012<sup>49</sup>.

## 5.11 Traffic


### 5.11.1 Access to Site

Access to the proposed site is via a private Transnet Service Road (gravel), running adjacent to the Sishen-Saldanha railway line. The Transnet Service Road is accessed *via* the Gariep Road, currently a gravel road, from either the N8 or N14. The road also provides access to farms located further north. This road was upgraded (widened to 8m and gravelled) during the construction of Bokpoort I and meet the requirements for the proposed development. Permission for use of the road was obtained during the application for construction for Bokpoort I, however, permission will have to be obtained once again for the construction of the development.

### 5.11.2 Road Network and Intersections

The N14, N10 and N8 are the National roads in the region and are the main link between the economic centres of Gauteng and Namibia. Access to the site is via the Gariep Road the Transnet Service Road. Details of the road network are given in Table 5-11<sup>50</sup>.

**Table 5-11: Overview of road network**

Road	Ownership	Geometry	Discussion	Layout
<b>Gariep Road (MR874)</b>	Northern Cape Department of Transport	Gravel road 2 lanes (one per direction) 10m wide Speed 60km/ hr Longitudinal profile: Flat	The road runs parallel and to the east of the Orange River serving as access to the farms along the Orange River. The road links the N14 with the N8. Major dust issues have been noted by farmers due to the increase of construction vehicles during the construction of Bokpoort I. The road is aligned through the southern sections of the farm Bokpoort	

<sup>44</sup> Hendey, Q.B. 1984. *Southern African late Tertiary vertebrates*. In: Klein, R.G. (Ed.) *Southern African prehistory and paleoenvironments*, pp 81-106. Balkema, Rotterdam.

<sup>45</sup> Schneider, G. & Marais, C. 2004. *Passage through time – the fossils of Namibia*. 159 pp. Gamsberg MacMillan, Windhoek.


<sup>46</sup> Almond, J.E. 2008. *Fossil record of the Loeriesfontein sheet area (1: 250 000 geological sheet 3018)*. Unpublished report for the Council for Geoscience, Pretoria, 32 pp. Natura Viva cc, Cape Town.

<sup>47</sup> Almond, J.E. 2009. *Contributions to the palaeontology and stratigraphy of the Alexander Bay sheet area (1: 250 000 geological sheet 2816)*, 117 pp. Unpublished report for the Council for Geoscience. Natura Viva cc, Cape Town.

<sup>48</sup> Moen, H.F.G. 2007. *The geology of the Upington area. Explanation to 1: 250 000 geology Sheet 2820 Upington*, 160 pp. Council for Geoscience, Pretoria.

<sup>49</sup> Almond, J.E. 2012. *Proposed upgrading of four road bridges along the N10 between Groblershoop & Lambrechtsdrift, Northern Cape. Recommended exemption from further palaeontological studies & mitigation*, 10 pp. Natura Viva cc, Cape Town.

<sup>50</sup> Van Wyk, L.; Reutener, I. 2016. *Bokpoort II Solar Farm: Photovoltaic Facility 1 Site Traffic Assessment Groblershoop*.

Road	Ownership	Geometry	Discussion	Layout
			Condition: Fair	
<b>Transnet Service Road (Loop 16 Access Road)</b>	Transnet	Gravel road 2 lanes (one per direction) 10m wide Speed 60km/hr Longitudinal profile: Flat	Private Transnet Service Road to serve the Sishen-Saldanha Railway line. The road is the main access to the Bokpoort Farm Condition: Fair Road was regravelled during the construction of Bokpoort I	

The intersections are currently all unsignalized intersections and operating at a good Level of Service (LOS) with sufficient spare capacity<sup>51</sup>.


Details of the LOS classifications are provided in Table 5-12.

**Table 5-12: LOS classifications**

LOS Category	Description
A	Free flow
B	Reasonably free flow
C	Stable flow, at or near free flow
D	Approaching unstable flow
E	Unstable flow, operating at capacity
F	Forced or breakdown flow

Details of the LOS expected at the Gariep Road and Transnet Service Road intersection are provided in Table 5-13.

**Table 5-13: Overview of Gariep Road/ Transnet Service Road intersection**

Intersection	LOS	Discussion	Layout
<b>Gariep Road/Transnet Service Road</b>	Existing A		
	During Construction (Phased Construction): A	Sight distance: Fair, after bridge over rail Dedicated right turning lanes: None	
	Southern approach: A	Safety: Poor Very little traffic currently on road	
	During Construction (Simultaneous Construction): A	The approach to the intersection is poor, with poor visibility and geometry	
Southern approach: D			
	During Operation: A		

<sup>51</sup> Van Wyk, L; Reutener, I. 2016. Bokpoort II Solar Farm: Photovoltaic Facility 1 Site Traffic Assessment Groblershoop.

### 5.11.3 Accident Hotspots

The Gariep Road is an accident hotspot and has seen a number of fatal accidents due to speeding, overtaking and poor visibility caused by dust generated by the vehicles using the road.

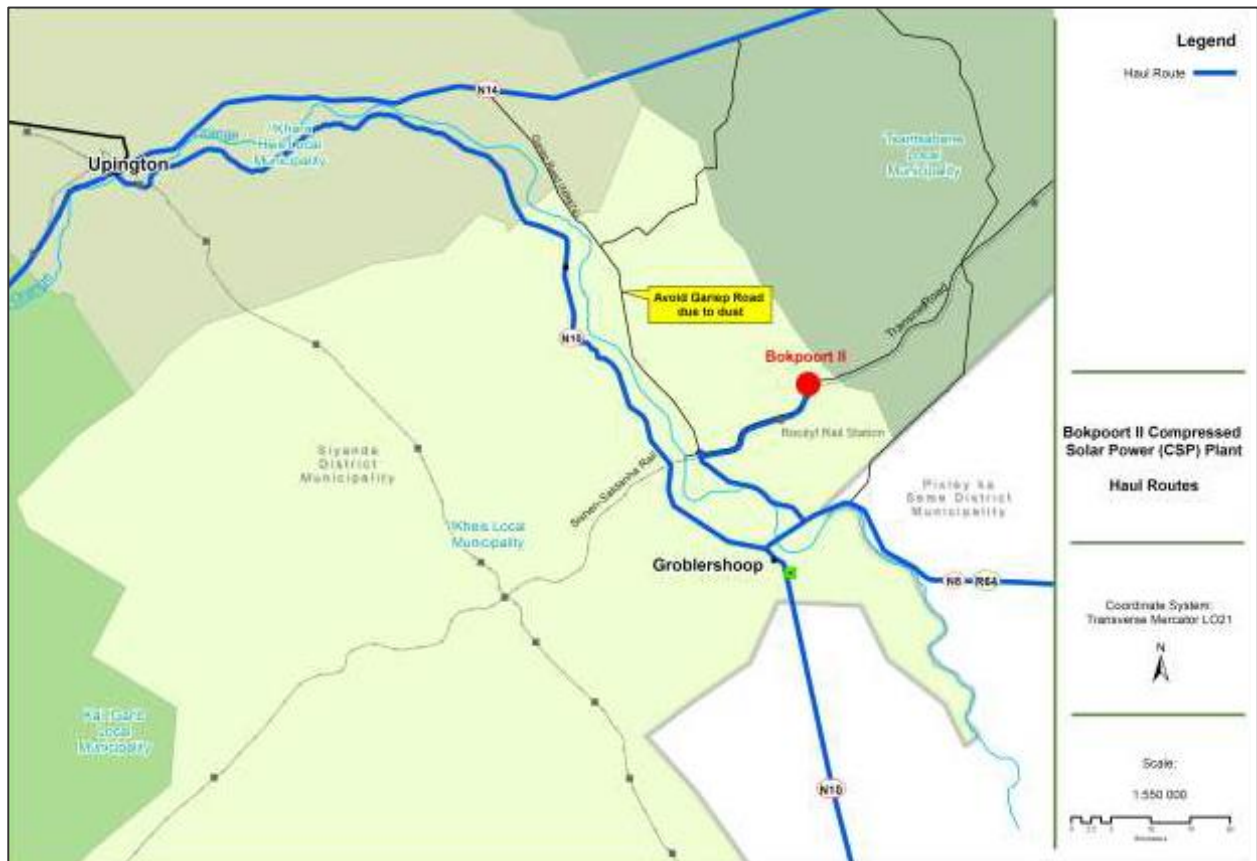
### 5.11.4 Haul Routes

The shortest haul route from Gauteng is via the N8 as shown in Table 5-14 (Figure 5-13).

**Table 5-14: Haul distance from Gauteng**

Road Distances from Gauteng	Length (km)
Johannesburg CBD to Bokpoort via N8 and R59	794
Johannesburg CBD to Bokpoort via N8 and N12	795
Johannesburg CBD to Bokpoort via N14 via Upington and then N10	908
Johannesburg CBD to Bokpoort N14 (Gariep Road) – not allowed	811

The Gariep Road from the N14 is not recommended as a haul route due to the road safety and dust issues. This route is however 97 km shorter than the alternative via the N10 when travelling from Upington. This should be noted in the construction tender.



**Figure 5-13: Haul routes**

### 5.11.5 Road Hierarchy

The road hierarchy is shown in Table 5-15 below. Traffic calming and parking is typically not allowed along the Mobility Corridors (Class 1, 2, 3), but is allowed along the Access Routes (Class 4, 5).

**Table 5-15: Road hierarchy**

Road	Class	Speed (km/ hr)
N14, N10, N8	Class 1, National Road	120
Gariep Road	Class 3, Minor arterial	80
Transnet Service Road	Class 5, Local access road	60

### 5.11.6 Dust

Due to the nature of the Gariep Road (calcrete) and the speed at which vehicles travel, a large amount of dust is generated by vehicles travelling on the road. The dust generated has an impact on the farming production rates. This is especially evident for farms where the Gariep Road is close to vineyards (within 1 km). Various complaints were received during the construction of Bokpoort I from farmers regarding dust generated by construction vehicles. The dust generation is a factor at the Gariep/ Transnet Service Road intersection as it affects the decision time for vehicles turning toward the proposed development.

## 5.12 Visual

### 5.12.1 Landscape Physical Characteristics and Land Use

Away from the Orange River corridor the predominant land use in the wider study area and including the majority of the Bokpoort Farm remains livestock rearing, predominately sheep. The Orange River valley/ corridor is predominated by the presence of irrigated agriculture, with the establishment of grape (sultana) vineyards evidently becoming more common. Game farming and hunting still occur in the Kalahari Oryx Game Farm located to the north and north-west of the Bokpoort Farm. The Bokpoort I CSP plant remains the only energy generation-industrial facility in the wider area with no other solar or wind power generation facilities having been constructed to date. There appears to have been little to no growth in settlements in the study area, with Groblershoop remaining a small rural town along with a handful of smaller settlements located close to the Orange River corridor.

### 5.12.2 Visual Receptors

All *sensitive* receptor locations in the 10 km radial area are presented in Table 5-16.

**Table 5-16: Static sensitive receptor locations located within a 10km radius of the proposed development site**

Distance (radius around infrastructure)	Receptor Type	Receptor Name	Closest Distance to Proposed Development	Receptor located Within Viewshed
0 - 5km	Farmstead (main homestead and smaller household)	Bokpoort Farmstead	1,97km	Yes
5 - 10km	Two Farmsteads	Eben Haeser Farmstead	7.71km	No

Distance (radius around infrastructure)	Receptor Type	Receptor Name	Closest Distance to Proposed Development	Receptor located Within Viewshed
	Farmstead (main homestead and smaller household)	La Gratitude Farmstead	6.25km	No
	Farmstead (main homestead and 3 smaller households)	Tities Poort Farmstead	7.9km	No
	Farmstead (main homestead and 2 smaller households)	Dinas Rus Farmstead	9.34km	No
	Farmstead (2 households)	Bloubos Farmstead	10.38km	No
	Farmstead (3 households)	Hoekvalkte Farmstead	10.58km	No

Seven (7) structures are located within a 5km radius around the site, all of which were listed as households. However only two are non-industrial or non-power generation-related, being the Bokpoort Farmstead and an associated farmworker's dwelling. The remainder are located either at the Bokpoort CSP Plant or at the Eskom Garona Substation. As such these other structures and the people working within them are unlikely to display any degree of visual sensitivity and accordingly only one sensitive receptor location exists within a 5 km radius of the development footprint.



Figure 5-14: Location of sensitive receptor locations within a 10km radius of the proposed development

## 5.13 Socio-economic Baseline

Socio-economic impact assessments were undertaken during November 2015 to February 2016 in support of the 75 MW Photovoltaic PV 1 and PV 2 as well the 150 MW CSP solar facilities by Smith and de Waal<sup>52 53 54</sup>.

### 5.13.1 Administrative Setting

The proposed project area is located in Ward 3 of the !Kheis Local Municipality (LM), ZF Mgcawu District Municipality (DM), Northern Cape Province. The ZF Mgcawu DM, which is classified as a Category C municipality forms the mid-northern section of the province on the frontier with Botswana. It covers an area of more than 100 000 square kilometres (almost 30% of the entire province). The DM comprises six local municipalities, namely: Mire; Kai! Garb; Kara Hails; Tsantsabane, !Kheis and Kgatelopele. Upington is the district municipal capital.

The !Kheis Local Municipality, formerly the Groblershoop Municipality, includes the settlements of Boegoeberg, Gariep, Grootdrink, Kleinbegin, Opwag, Topline and Wegdraai, was established from the. These settlements were previously part of the Siyanda and Karoo District Municipalities, who administrated these settlements and provided them with services up until the demarcation in November 2000. From December 2000, the !Kheis Municipality took over services and personnel and total service provision commenced on 1 July 2001<sup>55</sup>.

The IFCs Performance Standard 7 provides criteria for the identification of indigenous people and requires that project proponents implement culturally appropriate measures to mitigate the impacts of a project on indigenous people.

The South African government has acknowledged the Khoi and San as the original indigenous people of South Africa. The presence of Khoisan people in the Municipality triggered further investigation into the presence of an indigenous population in the Bokpoort II project area. The Socio-economic impact assessment confirmed that there is no evidence of the presence of any indigenous people residing or utilising the project area and immediate surrounds.

### 5.13.2 Population Demographics

According to available socio-economic baseline information, the total population of the !Kheis LM increased from 14950 in 1996 to 16539 in 2001 and 16637 in 2011. The Census of 2011 indicated 60.3% of the population to be of working age, 4.7% to be older than 65 and 35% to be younger than 16. The average population density in the Municipality is one person per square kilometre.

In 2011, Ward 3 of the !Kheis LM had a population of 2510 and the population of ZF Mgcawu DM was 157318. Groblershoop, 22km to the south, is the closest town to the proposed project area and it had a total population of 4938 in 2011.

<sup>52</sup> Smith, T; de Waal, D. 2016. *Socio-economic Impact Assessment for the proposed 75 MW Photovoltaic (PV1) Solar Facility (Bokpoort II Solar Development)*. Report No 1400951-302448-18.

<sup>53</sup> Smith, T; de Waal, D. 2016. *Socio-economic Impact Assessment for the proposed 75 MW Photovoltaic (PV2) Solar Facility (Bokpoort II Solar Development)*. Report No 1400951-303533-1.

<sup>54</sup> Smith, T; de Waal, D. 2016. *Socio-economic Impact Assessment for the proposed 150 MW CSP Tower Facility (Bokpoort II Solar Development) on the Remaining Extent of the Farm Bokpoort 390, Northern Cape*. Report No 1400951-299899-7.

<sup>55</sup> ZF Mgcawu District Municipality *Integrated Development Plan (IDP) 2016 - 2017*.



There were 4146 households in the LM of which 1209 were defined as agricultural households in the 2011 Census. The average household size was nearly four people per household and 33% of the households were headed by females.

Formal dwellings (66.3%) dominated the types of dwellings found in the municipality, but only 16.7% had piped water inside their dwellings, 64% used electricity for lighting and 27% had flush toilets connected to a reticulated sewerage system. The next most available sanitation system was flush toilets with a septic tank. A quarter (25%) of the population of the LM and 7% of Ward 3 did not have access to any sanitation system. The sanitation and sewerage systems in Ward 3 and the !Kheis LM are still inadequate.

There is a strong reliance on wood for cooking fuel, which is not sustainable and can lead to the overexploitation of especially camel thorn trees in the area.

There was an influx of people and heavy equipment during the construction of the Bokpoort I plant on the Remaining Extent of the Farm Bokpoort 390 to the south of the project area. Construction has been completed and the Bokpoort I plant is currently in operation.

### 5.13.3 Levels of Education

There is a school in Groblershoop and several farm schools in the regional area. Education levels are relatively low - 13.5% of the municipal population above the age of 20 has no formal schooling. Only 4.5% of the population over the age of 20 received a high school education and only 14% of this group achieved Matric qualifications. The dominant language spoken in the Municipality is Afrikaans (93%).

### 5.13.4 Economic Activities

The regional Gross Value Added (GVA) for 2010 is depicted in Table 5-17. The GVA consists of mainly mining and quarrying (18%), Agriculture, forestry and fishing (15%) in ZF Mgcawu DM and Agriculture, forestry and fishing (33%) and Wholesale and retail trade, catering and accommodation (19%) in the !Kheis LM.

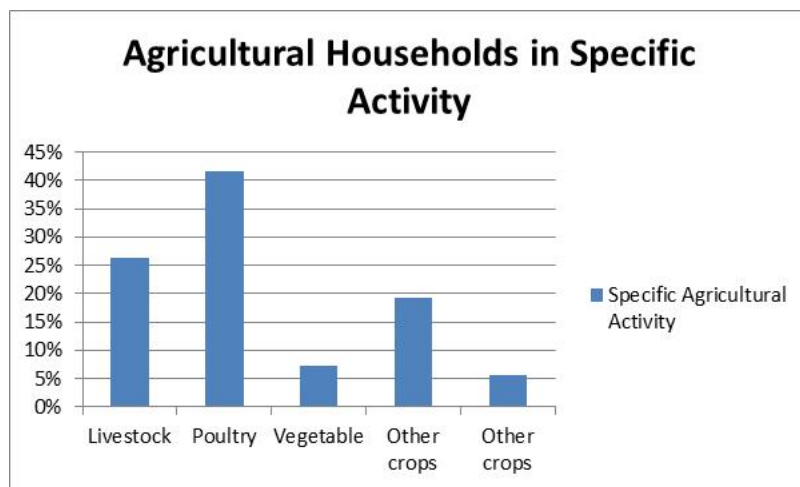
**Table 5-17: Contribution to GVA (2010)<sup>56</sup>**

Industry	Northern Cape	ZF Mgcawu DM	!Kheis LM
Agriculture, forestry and fishing	7%	15%	33%
Mining and quarrying	24%	18%	0%
Manufacturing	4%	6%	5%
Electricity, gas and water	2%	3%	3%
Construction	2%	2%	1%
Wholesale and retail trade, catering and accommodation	11%	13%	19%
Transport, storage and communication	10%	12%	7%
Finance, insurance, real estate and business services	15%	11%	12%
Community, social and personal services	10%	8%	10%

<sup>56</sup> Source: Quantec Data (2010) as contained in Smith, T; de Waal, D. 2016. Socio-economic Impact Assessment for the proposed 75 MW Photovoltaic (PV1) Solar Facility (Bokpoort II Solar Development).

Industry	Northern Cape	ZF Mgcawu DM	!Kheis LM
General government	15%	12%	11%

The major established economic growth centres are located in the Kimberley and Upington sub-regions. These are likely to remain the main economic driving forces for the future and will continue to attract rural and urban migrants. The agriculture sector is the main economic sector in the region. The majority of households within the Municipality are involved in poultry production followed by livestock production (Figure 5-15).



**Figure 5-15: Percentage of agricultural households in each particular activity within the !Kheis LM<sup>57</sup>**

The Orange River plays a crucial economic role in the ZF Mgcawu DM, with most of the economic activities linked to or located along the river. The Orange River area delivers a major part of South Africa’s table grape production. The Orange River Producers Alliance is a table grape industry that is renowned in as supplier of fresh table grapes to Europe with an output of more than 20 million cartons<sup>58</sup>.

More than 90% of Africa's total dried vine fruit production is produced through 1250 sultana grape growers in the Northern Cape who produced more than 50 000 tons in 2010. The sultanas produced here comprise more than 80% of that which is exported primarily to Europe and other eastern countries<sup>59</sup>. SAD Vine Fruit Pty (Ltd) is located in Upington and owns the largest dried vine fruit processing and packaging plant in South Africa, employing more than 350 persons. It has intakes at Groblershoop, Mylpaal, Louisvaledweg, Keimoes, Kakamas and Vredendal<sup>60</sup>.

The Orange River Wine Cellars Co-Op, also based in Upington, is the second largest winemaking cooperative in the world and has wine cellars at Groblershoop, Grootdrink, Upington, Keimoes and Kakamas. This Co-Op has more than 740 members who produce wine grapes and 445 farmers who produce grape juice<sup>61</sup>.

<sup>57</sup> Statistics South Africa. 2011. National Census.

<sup>58</sup> !Kheis LM Integrated Development Plan (IDP) 2014 - 2015.

<sup>59</sup> ZF Mgcawu District Municipality Integrated Development Plan (IDP) 2016 - 2017.

<sup>60</sup> Ibid.

<sup>61</sup> Ibid.

In the ZF Mgcawu DM, there are approximately 1600 farm land units, which belong to 890 owners. Because of the difference in the carrying capacity of the field, there are relatively large differences in the sizes of the farms. The carrying capacity of the field in this area can differ considerably between (for instance) a 10ha stock unit and 65ha stock unit further westwards<sup>62</sup>.

The central parts of the region consist mainly of semi-desert areas and are, therefore, with a few exceptions, mainly suitable for extensive livestock farming. Livestock farming occurs mainly on large farms where farming is extensive. The larger majority of these farms are privately owned.

The renewable energy sector is also recognised as a key developing sector. There has been an increase in these types of projects in South Africa. There is currently an application to construct a Hydropower project at the Boegoeberg Dam in the Orange River. This project also falls within the local Municipality and would contribute to the local economy.

### **5.13.5 Employment Levels**

The LM unemployment rate is high at 28% in the 2011 Census indicating that there are limited formal job opportunities in the municipality. Youth, or persons 35 years or younger, comprise 34.3% of the municipal unemployment rate.

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<sup>62</sup> *Ibid.*

## 6 PUBLIC PARTICIPATION PROCESS

Public participation is a process that is designed to enable all interested and affected parties (I&APs) to voice their opinion and/ or concerns which enables the practitioner to evaluate all aspects of the proposed development, with the objective of improving the project by maximising its benefits while minimising its adverse effects.

I&APs include all interested stakeholders, technical specialists, and the various relevant organs of state who work together to produce better decisions.

The primary aims of the PP process are:

- to inform I&APs and key stakeholders of the proposed application and environmental studies;
- to initiate meaningful and timeous participation of I&APs;
- to identify issues and concerns of key stakeholders and I&APs with regards to the application for the development (i.e. focus on important issues);
- to promote transparency and an understanding of the project and its potential environmental (social and biophysical) impacts (both positive and negative);
- to provide information used for decision-making;
- to provide a structure for liaison and communication with I&APs and key stakeholders;
- to ensure inclusivity (the needs, interests and values of I&APs must be considered in the decision-making process);
- to focus on issues relevant to the project, and issues considered important by I&APs and key stakeholders; and
- to provide responses to I&AP queries.

The PP process must adhere to the requirements of Regulations 41 and 42 (GNR 326 as amended). Further, a PP guideline in terms of NEMA was issued by the DFFE in 2017, of which provisions have been implemented.

The PP process for proposed project has been undertaken according to the steps outlined in Figure 6-1.



**Figure 6-1: Steps in the public participation process**

In order to achieve a higher level of engagement, a number of key activities have taken place and will continue to take place. These included the following:

- The identification of stakeholders is a key deliverable at the outset, and it is noted that there are different categories of stakeholders that must be engaged, from the different levels and categories of government to relevant structures in the non-governmental organisation (NGO) sector, to the communities of wards of residential dwellings which surround the study area;
- The development of a living and dynamic database that captures details of stakeholders from all sectors;
- The fielding of queries from I&APs and others, and providing appropriate information;
- The convening of specific stakeholder groupings/ forums as the need arises;
- The preparation of reports based on information gathered throughout the BA study via the PP process and feeding that into the relevant decision-makers;
- The PP process included distribution of pamphlets or Background Information Documents (BIDs); and
- Where appropriate site visits may be organised, as well as targeted coverage by the media.

The proposed project PP process has entailed the following activities.

## 6.1 Authority Consultation

The Competent Authority, the DFFE, is required to provide an Environmental Authorisation (whether positive or negative) for the project. The DFFE was consulted from the outset of this study and has been engaged throughout the project process. The Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NCDAERL) will be the commenting authority.

## 6.2 Consultation with Other Relevant Stakeholders

Consultation with other relevant key stakeholders has been undertaken through written correspondence in order to actively engage these stakeholders from the outset and to provide background information about the project during the BA study.

## 6.3 Site Notification

The EIA Regulations 2014 (as amended) require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates and at points of access or high through traffic. The purpose of this is to draw people's attention to the project and make them aware that they are able to play a role in the project.

I&APs were identified primarily from responses received from the notices that were placed, notifying the public of the project and the invitation for the public to register as stakeholders and inform them of the PP process.

A number of notices at various noticeable locations (Groblershoop Town and !Khies Local Municipality Municipal Office) in the study area on 06 July 2021 (**Appendix G**).

## 6.4 Identification of Interested and Affected Parties

I&APs were identified through the previous EIA studies and has been updated on an on-going basis. E-mails were sent to key stakeholders and other known I&APs on 29 June 2021, informing them of the application for the project and indicating how they could become involved in the project.

## 6.5 Background Notification

A background notification document for the proposed project was compiled in English and distributed to key stakeholders and registered I&APs via email.

The aim of this document is to provide a brief outline of the application and the nature of the development. It is also aimed at providing preliminary details regarding the BA study and explains how I&APs could become involved in the project.

## 6.6 Advertising

In compliance with the EIA Regulations 2014 (as amended), notification of the commencement of the BA study and review of the draft consultation BAR for the project was advertised in a local newspaper as follows:

- Gemsbok Newspaper on 21 July – 20 August 2021 (**Appendix G**).

The primary aim of this advertisement was to ensure that the widest group of I&APs possible was informed and invited to provide input and questions and comments on the project.

## 6.7 Issues Trail

Issues and concerns raised in the PP process are compiled into an Issues Trail.

### 6.7.1 Public Review of the Draft Consultation BAR

The draft consultation BAR was made available for authority and public review for a total of 30 days (21 July – 20 August 2021).

The report was made available at the following public locations within the study area, which are all readily accessible to I&APs:

- !Kheis Municipal Public Library – Groblershoop.
- !Kheis Municipal Offices-Groblershoop.
- Electronically on the Royal HaskoningDHV Website: <https://www.royalhaskoningdhv.com/en/south-africa/projects/environmental-reports>.

## 6.8 Final BAR

The final stage in the BA study entails the capturing of responses and comments from I&APs on the draft consultation BAR in order to refine the BAR and ensure that all issues of significance are addressed. An electronic copy of the final BAR will be sent to all registered I&APs.

## 7 IMPACT ASSESSMENT

### 7.1 Introduction

Impact assessments must take account of the nature, scale and duration of effects on the environment, whether such effects are positive (beneficial) or negative (detrimental). Each issue/ impact is also assessed according to the project stages from planning, through construction and operation to the decommissioning phase. Where necessary, the proposal for mitigation or optimisation of an impact is noted. A brief discussion of the impact and the rationale behind the assessment of its significance is provided in this Section.

The EIA of the project activities is determined by identifying the environmental aspects and then undertaking an environmental risk assessment to determine the significant environmental aspects. The environmental impact assessment is focussed on the following phases of the project namely:

- Pre-Construction Phase;
- Construction Phase; and
- Operational Phase.

Decommissioning is unknown at this stage.

### 7.2 Impact Assessment Methodology

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- **Nature:** A brief written statement of the environmental aspect being impacted upon by a particular action or activity;
- **Extent:** The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- **Duration:** Indicates what the lifetime of the impact will be;
- **Intensity:** Describes whether an impact is destructive or benign;
- **Probability:** Describes the likelihood of an impact actually occurring; and
- **Cumulative:** In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The identified impacts are assessed in accordance with the approach outlined below extracted from the Final EIR compiled by Golder Associates<sup>63</sup> (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity, which are further sub-divided as follows:

Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Scale/extent of impact	Magnitude (severity) of impact

<sup>63</sup> Schlechter, M., & Baxter, B. 2016. *Final EIA Report: Proposed 75MW Photovoltaic (PV2) Solar Development on the Remaining Extent of the Farm Bokpoort 390, Northern Cape*. Golder Associates. Ref 14/12/16/3/2/880.

To assess each of these factors for each impact, the following four ranking scales are used:

**Table 7-1: Criteria for the ranking of impacts**

Probability	Duration
5 - Definite/ don't know	5 - Permanent
4 - Highly probable	4 - Long-term
3 - Medium probability	3 - Medium-term (8 - 15 years)
2 - Low probability	2 - Short-term (0 - 7 years) (impact ceases after the operational life of the activity)
1 - Improbable	1 - Immediate
0 - None	0 - None
Scale	Magnitude
5 - International	10 - Very high/ don't know
4 - National	8 - High
3 - Regional	6 - Moderate
2 - Local	4 - Low
1 - Site only	2 - Minor
0 - None	0 - None

Once these factors have been ranked for each impact, the significance of the two aspects, occurrence and severity, must be assessed using the following formula:

$$\text{SP (significance points)} = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$$

The maximum value is 100 significance points (SP). The impact significance is then rated as follows:

**Table 7-2: Impact significance**

<b>SP &gt;75</b>	Indicates high environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
<b>SP 30 - 75</b>	Indicates moderate Environmental significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated.
<b>SP &lt;30</b>	Indicates low environmental significance	Impacts with little real effect and which should not have an influence on or require modification of the project design.
<b>+</b>	Positive impact	An impact that constitutes an improvement over pre-project conditions

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will have been included in the EMPs (**Appendix E & F**).

### 7.3 Potential Impacts and Significance

The following sections will provide a description of the potential impacts by the specialist assessment, EAP and through the PPP as well as the assessment according to the criteria described in Table 7-1 and Table 7-2.



The environmental impacts of the project were assessed for the:

- Construction phase;
- Operational phase; and
- Closure and rehabilitation phase.

Potential cumulative impacts were also identified and assessed for each component, where applicable.

### **7.3.1 Soils and Agricultural Potential**

#### **7.3.1.1 Construction**

During construction, agricultural grazing land directly occupied by the development infrastructure, which includes all associated infrastructure, will become unavailable for agricultural use. The impact is assessed as being **moderate** with and without mitigation (**SP = 35**). The significance rating only comes out moderate because of the way the definite probability and the long-term duration influence the calculation. In the opinion of the Agricultural Specialist, the actual significance of this impact is low.

Soil degradation can result from erosion, topsoil loss and contamination. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction-related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related excavations. Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth. The impact is **low** with mitigation (**SP = 18**) and the significance can be reduced even **lower (SP = 12)** with the implementation of the following mitigation measures:

- Implement an effective system of stormwater run-off control, where it is required - that is at all points of disturbance where water accumulation might occur. The system must effectively collect and safely disseminate any run-off water from all hardened surfaces, and it must prevent any potential down slope erosion. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring.
- If an activity will mechanically disturb the soil profile below surface, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation, which may be after construction or only at decommissioning. The maximum depth of topsoil stripping should be 30 cm.
- Erosion must be carefully controlled where necessary on topsoiled areas.

#### **7.3.1.2 Operations**

Loss of agricultural land use and soil degradation occur at the start of the construction phase and are therefore not listed under operational phase impacts. There is no further loss of land that occurs in subsequent phases.

#### **7.3.1.3 Closure and Rehabilitation**

During closure and decommissioning, soil degradation can result from erosion, topsoil loss and contamination. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by decommissioning-related land surface disturbance. Loss of topsoil can result from poor topsoil management during decommissioning related excavations. Hydrocarbon spillages from decommissioning activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth.

The impact is **low** with mitigation (**SP = 15**) and the significance can be reduced even **lower (SP = 10)** with the implementation of the mitigation measures provided during construction.

#### 7.3.1.4 *Cumulative*

The potential cumulative agricultural impact of importance is a regional loss or degradation of agricultural land, with a consequent decrease in agricultural production. The loss of agricultural land in the area is highly likely to be within an acceptable limit in terms of loss of low potential agricultural land, of which there is no scarcity in the country.

It should also be noted that there are few land uses, other than renewable energy, that are competing for agricultural land use in this area. The cumulative impact from developments, other than renewable energy, is therefore **low**. Due to all of the considerations discussed above, the cumulative impact of loss of agricultural land use is assessed as having **low** significance.

### 7.3.2 *Water Resources (Surface and Groundwater)*

#### 7.3.2.1 *Construction*

The surface and groundwater quality can be impacted by spillage of fuel and lubricants, chemicals from construction equipment, vehicles and temporary workshop during the construction phase. The impact is rated as **low (SP = 24)** before mitigation and **low (SP = 12)** with mitigation.

- Mitigation for spillage or leakages include the implementation of secondary containment structures e.g. bunded areas to prevent the accidental release of fuel or oil.
- Spillages must be cleaned up immediately and contaminated soil must either be remediated in situ or disposed of at an appropriately licenced landfill site.
- Potentially contaminating wastes e.g. cement must be stored in bunded areas until removed by a reputable contractor for disposal at an appropriately licenced site.
- Place drip trays under vehicles when parked.
- Service vehicles in a dedicated workshop area.
- Providing environmental awareness training for workers on site.

#### 7.3.2.2 *Operations*

Impacts on water resources are not expected during the operational phase, maintenance activities typically involve replacement of line hardware, inspections and repair of the line, maintenance activities are also restricted to the servitude.

#### 7.3.2.3 *Closure and Rehabilitation*

The impacts will be similar as for the construction phase i.e. **low (SP = 24)** before mitigation and **low (SP = 12)** with mitigation.

### 7.3.3 *Ecology*

#### 7.3.3.1 *Construction*

The construction phase usually results in the most significant impacts. It is during this phase that most of the destruction of habitat and microhabitat takes place. Vegetation clearing will occur as a result of the construction of the substation expansion and the 400kV LILO powerline. This will cause additional fragmentation and habitat disturbance in the landscape. This disturbance destroys primary vegetation. Clearing of additional surface areas has the effect of creating unnatural open spaces through the vegetation and the matrix of the landscape. For the smaller species, it limits movement and restricts access to foraging sites. This results in reduced population density of prey species (invertebrates and/ or smaller birds and/ or smaller mammals and/ or herpetofauna) which then reduces the food availability for predators invertebrates and/ or larger birds and/ or larger mammals and/ or herpetofauna). The changes in the vegetation structure also alter the availability of suitable cover for many faunal species.

Additional clearance of primary vegetation allows secondary pioneer species or invasive plants to enter and re-colonise disturbed areas, thus increasing the possibility of alien species invading. Invasive species affect natural biodiversity in a number of ways. They may compete directly with natural species for food or space, may compete indirectly by changing the food web or physical environment, or hybridize with indigenous species. Rare species with limited ranges and restricted habitat requirements are often particularly vulnerable to the influence of these alien invaders. Much of the area associated with the proposed development has already had some form of disturbance in it, such as roads, fences and infrastructure, and is already highly fragmented. The impact of additional loss of natural vegetation, alien invasion and further habitat fragmentation is assessed as **low (SP = 24)** pre-mitigation and still considered **low (SP = 18)** when taking into consideration the proposed mitigation:

- The significance of the loss of habitat may be mitigated slightly if there are areas with suitable ecological corridors this may be possible by ensuring that no disturbance occurs in the areas outside the development footprint. Only the actual development must be disturbed, the surrounding edges must be regarded as no-go areas.
- A comprehensive Alien Invasive Plant removal programme must be drawn up and implemented.

As the area of the development footprint is already disturbed and the likelihood of SCC occurring within this development footprint area is considered **low (SP = 24)**, the impact of this development on SCC cannot be considered to be significant. There is no habitat within the proposed development footprint that is specific/critical to any faunal SCC. The following mitigation measure can reduce this impact further and is still categorized as **low (SP = 18)**:

- A search and rescue operation should be performed prior to clearing, it should however be noted that this is not a feasible or practical option with regard to the protected trees.

Anthropogenic disturbances include aspects such as, vibrations caused by machinery and vehicles. These aspects will impact on invertebrate species more than any other faunal species. These anthropogenic disturbances impact on the way invertebrates forage. For example; some invertebrates use vibrations caused by their prey to locate and catch them. Vibrations caused by construction equipment will make this impossible. Smaller fauna will inevitably be killed during land clearing activities as these activities will destroy their habitat. Some faunal species may be killed as a result of increase vehicle traffic on the roads. Some faunal species may also be killed as a result of operational activities or presence of infrastructure, such as the overhead lines.

The proposed development area is disturbed and fragmented by surrounding infrastructure which decreases the suitability of the area as a foraging area, thereby decreasing the probability of occurrence. In addition to unintentional killing of fauna, some faunal species, particularly herpetofaunal species, are often intentionally killed as they are thought to be dangerous. The impact of anthropogenic disturbances, intentional and/ or accidental killing of fauna is considered to be **low (SP = 24)** pre-mitigation and **low (SP = 20)** pre-mitigation when applying the following mitigation measures:

- There is unfortunately no mitigation for the vibrations caused by machinery/ vehicles, except perhaps ensuring that activities are kept to a minimum.
- The intentional killing of fauna can be mitigated through education and training and the enforcement of a strict policy against the killing of fauna.

### 7.3.3.2 Operations

Alien invasive plants must be managed during the operations phase. The application of effective mitigation measures is critical in ensuring an impact of low environmental significance post-mitigation. The impact is rated as being potentially of **moderate (SP = 30)** significance and can be mitigated to **low (SP = 15)**

significance by continuing with implementation of the Alien Invasive Plant removal programme during the operations phase.

### 7.3.3.3 Closure and Rehabilitation

The spread of alien invasive plants, particularly invasive plant propagules by heavy machinery and earthworks could cause an impact of **low** significance (**SP = 24**), depending on the invasive plant species that occur in the area. The Alien Invasive Plant removal programme must be continued in all stages of the development. Ongoing monitoring must be conducted by the ECO and periodic monitoring (annual) by a qualified ecologist to ascertain the efficacy of the programme. This impact is rated **low (SP = 16)** post-mitigation.

### 7.3.3.4 Cumulative

This type of development on the biodiversity indicates that none of the anticipated impacts can be highlighted or construed to represent an unacceptable or severe threat to sensitive biodiversity within the development footprint, however it does form part of a larger development and the cumulative impacts associated with every phase of this development does have a significant impact to the biodiversity in the greater area. The surrounding development has already resulted in the loss of a significant number of SCC, especially the loss of a large amount of *Boscia albitrunca* trees, this cumulative impact increases the significance of the loss of these trees related to this specific development.

A biodiversity offset has therefore been mandated for the Project DAO PV development, to ensure that all residual impacts associated with the development as a whole are adequately compensated, the offset area calculation has included all aspects/ phases of the project including the expansion of the Garona Substation.

## 7.3.4 Avifauna

### 7.3.4.1 Construction

The removal and/ or destruction and/ or alteration of habitat used by birds, may impact on the foraging and/or breeding success of certain species, and will lead to numerous birds being displaced from the projects site, and needing to find suitable available habitat elsewhere. Habitat loss may affect, and be more significant for important terrestrial species such as coursers, korhaans and bustards. Raptors (e.g. Martial Eagle, Black-chested Snake-Eagle and Pale Chanting Goshawk) may also be affected to a lesser degree, through the loss of potential hunting habitat.

The impact is rated as **moderate (SP = 70)** without mitigation and **moderate (SP = 60)** with mitigation. The proposed mitigation measures are provided below:

- A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat.
- High traffic areas and buildings such as offices, batching plants, storage areas etc. must, where possible be situated in areas that are already disturbed.
- Existing roads and farm tracks must be used where possible.
- The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths.
- No off-road driving must be allowed.

Disturbance and displacement - the proposed project imposes a risk of temporary or permanent disturbance and displacement of birds due to construction activities. The significance rating of this impact before mitigation is **moderate (SP = 48)** and is reduced to **moderate (SP = 30)** after mitigation.

The proposed mitigation measures are provided below:

- Prior to construction, an Avifaunal Specialist must conduct a site walkthrough to identify any nests/ breeding/ roosting activity of sensitive species, as well as any additional sensitive habitats. The results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around avian breeding and/ or movement schedules, and lowering levels of associated noise.
- The appointed ECO must be trained by an Avifaunal Specialist to identify the potential Red Data species as well as the signs that indicate possible breeding by these species.
- The ECO must then, during audits/ site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species.
- If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an Avifaunal Specialist must be contacted immediately for further assessment of the situation and instruction on how to proceed.
- A construction phase bird monitoring programme must be implemented by an Avifaunal Specialist.

#### 7.3.4.2 Operations

Disturbance and displacement - the proposed project imposes a risk of disturbance and displacement of birds due to ongoing operational and maintenance activities. The significance rating of this impact before mitigation is **moderate (SP = 56)** and is reduced to **low (SP = 24)** after mitigation.

The following mitigation measures are proposed:

- A site-specific operational EMPr must be implemented, which gives appropriate and detailed description of how operational and maintenance activities must be conducted to reduce unnecessary disturbance.
- All contractors must adhere to the EMPr and should apply good environmental practice during all operations.
- The on-site operational facilities manager (or a suitably appointed Environmental Manager) must be trained by an Avifaunal Specialist to identify the potential Red Data species as well as the signs that indicate possibly breeding by these species.
- If a priority species or Red Data species is found to be breeding (e.g. a nest site is located) on or within 2 km of the operational facility (or the grid connection servitude), the nest/ breeding site must not be disturbed, and the Avifaunal Specialist must be contacted for further instruction.
- Operational phase bird monitoring, in line with the solar guidelines, must be implemented.

Collision with infrastructure – collision risk with powerlines remains the most important potential impact to consider regarding avifauna. However, many of the individual contributions of powerline specific features (e.g. capacity, configuration, conductor cable diameter and height) to collision risk remain relatively poorly understood. In most cases individual contributions of each feature such as wire height cannot be dissociated from other features associated with voltage such as number and spacing of wires levels, span length, and cable diameter of conductors (etc.). Therefore, studies assessing the impacts of powerlines on various bird species most often consider both 132kV and 400kV powerlines to be in the same 'high voltage transmission line' category<sup>1,2</sup> and assume that both pose similar risks to avifauna.

As bustards and cranes, particularly Ludwig's Bustard (relevant to this project) and Blue Crane (not relevant to this project) appear to dominate the tally of collision victims in South Africa<sup>64</sup> the results of Anderson

<sup>64</sup> Shaw, J.M., T.A Reid, B.K Gibbons, M Pretorius, A.R Jenkins, R Visagie, M.D Michael, P.G Ryan. 2021. A large-scale experiment demonstrates that line marking reduces power line collision mortality for large terrestrial birds, but not bustards, in the Karoo, South Africa, *Ornithological Applications*, Volume 123, Issue 1.

(2002)<sup>65</sup> may be relevant. These results indicate that the increased capacity of the grid connection from 132kV to 400kV may impose a lower risk to bustards, as the study reported an average of 1.6 bustard fatalities per kilometre per year on a 132kV line and 0.91 bustards per kilometre per year on a 400kV powerline during 1997-1999 in the Eastern Karoo.

Priority species are similarly unlikely to enter the substation yard and therefore impacts associated with collisions or electrocutions caused by electrical infrastructure are unlikely to be significant.

The significance rating of this impact is **high (SP = 90)** before mitigation and **low (SP = 24)** after mitigation. Proposed mitigation includes the following:

- An Avifaunal Specialist must conduct a site walkthrough of the final grid connection route and pylon positions prior to construction to determine if, and where, bird flight diverters (BFDs) are required.
- The preferred pylon option from an avifaunal perspective would be whichever design achieves the lowest maximum height.
- Should guyed pylons be constructed the supporting guy wires must be marked with suitable marking devices such as flappers or appropriate BFD.
- All new spans of overhead powerlines are to be fitted with appropriate BFD (i.e. on the earth wires) to reduce the risk of collisions should birds be attracted towards the solar facilities and associated infrastructure such as evaporation ponds.
- Install BFD as per the instructions of the specialist following the site walkthrough.
- The operational monitoring programme must include regular (at least monthly) monitoring of the grid connection powerline for collision (and electrocution) mortalities.
- Any mortalities should be reported to the Endangered Wildlife Trust (EWT).
- Where the grid connection powerline runs adjacent to an existing line, new pylon positions should be staggered between existing pylons (where practically possible given the limitations of the design and engineering requirements) to increase the visibility of both lines to birds and further reduce the risk of collisions.
- Investigate the applicability of pole-mounted near-ultraviolet light (UV-A; 380–395nm) Avian Collision Avoidance System (ACAS) on overhead powerlines in addition to BFD to increase visibility of powerlines to birds in low light or poor visibility conditions.

Electrocution - electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/ or live and earthed components<sup>66</sup>. With regard to the grid connection infrastructure, overhead powerline infrastructure with a capacity of 132kV or more do not generally pose a risk of electrocution due to the large size of the clearances between the electrical infrastructure components. Electrocutions are therefore more likely for larger species whose wingspan is able to bridge the gap such as eagles or vultures. Various large raptors (such as Martial Eagle, Verreaux's Eagle and Lappet-faced Vulture), susceptible to electrocution (particularly in the absence of safe and mitigated structures) may occur in the broader project area. Mitigation measures nevertheless remain effective at reducing the potential risk of electrocution. The significance rating of this impact before mitigation is **moderate (SP = 72)** and was reduced to **low (SP = 24)** after mitigation.

<sup>65</sup> Anderson, M. D. 2002. *The effectiveness of two different marking devices to reduce large terrestrial bird collisions with overhead electricity cables in the eastern Karoo, South Africa. Report 1. Karoo Large Terrestrial Bird Power line Project, Eskom, Johannesburg, South Africa.*

<sup>66</sup> Dwyer, J. F., Pandey, A. K., McHale, L. A., & Harness, R. E. 2019. *Near-ultraviolet light reduced Sandhill Crane collisions with a powerline by 98%. The Condor, 121(2). doi:10.1093/condor/duz008*

Proposed mitigation includes:

- The structures to be constructed must be approved by the EWT Wildlife and Energy Programme or a suitably qualified Avifaunal Specialist.
- The operational monitoring programme for the project must be in line with applicable guidelines and must include regular monitoring of the grid connection powerline and substation for electrocution (and collision) mortalities.
- Any mortalities should be reported to the EWT.
- Prevent birds from nesting in and around the substation through exclusion covers or spikes.

Disruption of bird movement patterns - utility scale solar energy facilities may form a physical barrier to movement of birds across the landscape, and this may alter migration routes and increase distances travelled and energy expenditure or block movement to important areas such as hunting and foraging areas. The significance rating of this impact before mitigation is **moderate (SP = 39)** and is reduced to **low (SP = 20)** after mitigation.

The following mitigation measures are prescribed:

- Where not prescribed by technical or local and international requirements, external lighting must be of an intermittent and coloured nature rather than constant white light to reduce the potential impact on the movement patterns of nocturnal species. Habitat rehabilitation and promoting the regrowth of natural vegetation below the solar panels would reduce the barrier effect to some bird species reluctant to cross unsuitable habitat or cleared vegetation, such as francolins.
- Perimeter fencing must be designed to prevent entrapment of large bodied species such as korhaans between fence rows, giving them sufficient space for take-off, i.e. if a double-layer of parallel fencing is used, the gap between the fences should be large enough to allow for large birds to take-off and leave the area. Where this would result in unacceptable compromises to the security of the site, large-bodied birds should be prevented from entering the gaps between parallel fence rows. Perimeter fence design to be done in consultation with an Avifaunal Specialist.

### 7.3.4.3 Cumulative

The proposed 400kV LILO powerline route is relatively short and runs in close proximity to existing and authorised infrastructure. In the immediate vicinity, the proposed powerline route runs near or adjacent to the operational Bokpoort CSP Solar Facility, existing powerline infrastructure, the existing Sishen-Saldanha railway, an existing road and the authorised and approved Project DAO Solar PV Plant. This position combined with the high levels of existing disturbance on the site make it unlikely that the proposed LILO grid connection route will significantly contribute to an increased cumulative negative impact on local avifauna, particularly with regards to priority species as they are unlikely to be present. Additional overhead powerlines and towers have the potential to reduce the existing risks to avifauna (such as powerline collisions) by increasing the visibility of the lines to avifauna if suitable line-marking devices (such as BFD) are used and if new pylons can be positioned in a staggered manner relative to the existing pylons.

## 7.3.5 Air Quality

### 7.3.5.1 Construction

Emissions - the following possible sources of particulate matter (PM) emissions have been identified for the construction phase:

- Vehicle activities associated with the transport of equipment to the site;
- Preparation of the surface area prior to development; and
- The removal of construction equipment from site after the set-up of new infrastructure.

Vehicles travelling to and from the site will emit PM and gases, such as NO<sub>x</sub>. Expected vehicle volumes, however, will not result in any significant impact on local air quality beyond the direct vicinity of key transport routes. The impact is rated as having a **moderate** impact (**SP = 30**) without mitigation and **low** (**SP = 20**) and with mitigation.

The following mitigation measures are proposed:

- Control techniques for fugitive PM sources during the construction phase include watering, chemical stabilisation or reduction of surface wind speed with windbreaks or source enclosures. Watering is the most common and least expensive method, although it only provides temporary dust control.

### 7.3.5.2 Operations

If areas exposed during the construction phases are promptly revegetated, emissions during the operational phase are expected to be insignificant.

The impact assessed as being **low** (**SP = 16**) significance with and without mitigation for fugitive PM emissions, mitigation measures include:

- Revegetation of areas exposed for long-term dust and water erosion control is the most cost-effective option. Plant roots bind the soil, and vegetation cover breaks the impact of falling raindrops, thus preventing wind and water erosion. Plants used for revegetation should be indigenous to the area, hardy, fast-growing, nitrogen-fixing, provide high plant cover, be adapted to growing on exposed and disturbed soil (pioneer plants) and should easily be propagated by seed or cuttings.

The impact assessed for wheel entrained and vehicular emissions has been assessed as being **moderate** (**SP = 40**) significance for both mitigation and without mitigation.

While motor vehicles emit gaseous pollutants such as NO<sub>x</sub>, the expected traffic levels to and from the site indicate that there will not be significant ambient air quality impacts beyond the access routes. Wheel entrained dust can supplement the PM load. Various measures are available to limit emissions by vehicles accessing and travelling on-site:

- Clear, signposted roads with no off-road driving permitted;
- Limit unnecessary travel on-site;
- Planned, efficient check and maintenance routines;
- Controlled access;
- Clear signage;
- Signposted speed limits onsite and the use of speed humps, if necessary, to enforce on-site speed limit; and
- Prevent idling of vehicles at the access gate.

### 7.3.5.3 Closure and Rehabilitation

Ambient pollutant concentrations and nuisance dustfall rates will increase during the decommissioning period. Impact is likely to be localised near demolition activities. With mitigation, off-site exceedances are not expected. Windbreaks and source enclosures can be used during demolition, rubble removal, infilling, levelling and topsoil covering. Rubble piles can be covered and transported away from the site in covered trucks. It is key that all exposed areas are vegetated as soon as possible during the decommissioning process.

The impact is rated as having a **low** impact (**SP = 15**) with and **low** impact (**SP = 12**) without mitigation. Refer to mitigation measure proposed during the construction phase.



#### **7.3.5.4 Cumulative**

During construction there is some risk that the construction activities could contribute to elevated particulate matter concentrations and nuisance dustfall rates off-site during high wind speed events. Cumulative impacts are likely to be limited in duration and frequency and of **low** significance with the implementation of mitigation measures mentioned above.

### **7.3.6 Heritage**

#### **7.3.6.1 Construction**

Heritage impacts are categorised as:

- Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries;
- Indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment
- Cumulative impacts that are combinations of the above.

For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed. Should any heritage artefacts be exposed during excavation the following shall apply:

- Known sites should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should be notified that archaeological site might be exposed during the construction activities.
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible.
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken.
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site.
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51(1).

#### **7.3.6.2 Cumulative**

The cultural heritage profile of the larger region is very limited. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance. In addition to the Stone Age profile, there is also the colonial element. This manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines, which occurs only in limited numbers. This again has the implication that the cumulative impact would be very low.

### **7.3.7 Palaeontology**

#### **7.3.7.1 Construction**

No significant fossil heritage resources have been recorded within the study area. The area is inferred to be of low sensitivity in terms of palaeontological heritage and no sensitive or no-go areas have been identified

within it during the present desktop assessment. The overall impact significance of the construction phase is assessed as **low (SP = 16)** without mitigation, and **low (SP = 8)** after mitigation.

Monitoring of all substantial bedrock excavations for fossil remains by ECO on an ongoing basis during construction phase, with reporting of any substantial new palaeontological finds (notably fossil vertebrate bones and teeth) to SAHRA for possible specialist mitigation.

### 7.3.8 Traffic<sup>67</sup>

#### 7.3.8.1 Construction

The traffic impacts associated with the ten 132kV powerlines as well as the substation presented in Option 2 has been previously assessed and authorised as part of the PV development, the 400kV LILO powerline will replace these 132kV powerlines therefore no additional traffic impacts are envisaged.

The envisioned impact of the development during the construction phase on the surrounding road network includes:

##### a) Deterioration of road network condition

The increase in traffic, and especially of vehicles carrying heavy loads will cause an increase in deterioration of the road network. The heavy vehicles are unlikely to have a significant impact on the National roads (N10, N14 and N8) as these roads have been built to high standard to carry heavy loads over a long design period. The surrounding gravel road network (Gariep and Transnet Service Roads) have not been designed to carry many repetitions of heavy loads as they cater specifically for local farmers and for the maintenance access to the Sishen-Saldanha railway line. There is a high possibility that the gravel roads will sustain damage during the construction period.

The significance of the impact is reduced from a **moderate impact (SP = 60)** before mitigation to a **low impact (SP = 24)** with the following mitigation:

- The Transnet Service Road must be re-gravelled (150 mm thick over width) before construction commences. The prevention of dust, maintenance of the gravel road and re-gravelling of the road to be coordinated with Transnet. Once re-gravelled, the road should be regraded on a monthly basis to prevent the deterioration of the road condition.

##### b) Increase in dust

This impact is only applicable to the gravel roads. Dust is generated due to heavy vehicles and high speeds; therefore, the impact is more significant during the construction phase than during the operational phase. Farmers in the area are concerned about potential dust generated due to the increase in vehicles on the nearby roads. Transnet is also concerned regarding dust on their railway lines.

Dust impacts will be reduced from a **moderate (SP = 60)** to a **low (SP = 18)** significance by regularly (at least daily, depending on the wind intensity and direction as well as rain conditions) suppressing the dust especially in the road section adjacent to the Bokpoort CSP plant and proposed development.

##### c) Increase in traffic volumes impacting on LOS

The increase of traffic during the peak hour of 90 vehicles for simultaneous construction i.e. Project DAO PV development, the 400kV LILO powerline and the expansion and upgrade of the Garona Substation, will have a significant impact on the LOS of the roads or intersections during the construction period, with the LOS being maintained at a LOS D for the southern approach (Gariep Road) at the

<sup>67</sup> Applicable to the development of the PV plant as well as 400kV powerline and substation expansion.

Gariiep/ Transnet Service Road intersection. The entire intersection, however, will maintain a LOS A for the simultaneous construction activities.

The intersection was analysed for different scenarios for the construction period with the worst case being the simultaneous construction as well as the Bokpoort CSP Plant. Regarding the worst-case scenario, the southern approach of the intersection will operate at a LOS E for the duration of the construction period due to high volume of vehicles as well as the dust generated.

The impact significance before mitigation is **moderate (SP = 60)** and of a **low** significance (**SP = 24**) with mitigation, provided the following measures are implemented:

- The delivery of materials and equipment by trucks can be phased through the day to reduce the impact the trucks have on traffic congestion and dust generation. The delivery of materials/equipment by abnormal vehicles, must be scheduled during off-peak periods in order to have the least impact on traffic conditions.
- As far as possible, construction traffic should follow the route via Upington and Gariiep Road northbound and avoid using the northern section of the Gariiep Road between the N14 and the Transnet Service Road.
- On-site accommodation may be provided, and transport arranged for the labourers on site, to reduce the traffic volumes using the gravel roads (Gariiep Road and Transnet Service Road).

#### d) **Deterioration of road safety conditions**

Road safety deterioration is due to dust and speeding, causing drivers to lose control on the gravel roads. As a result of the upgrade of the Gariiep Road for the construction of Bokpoort CSP plant, drivers are able to reach high speeds exceeding the recommended 80 km/ hr speed limit. High speed accidents and fatalities has occurred, including some of the construction staff.

The speed limit must be managed by the local Traffic Police on the Gariiep Road, this will increase the road safety and minimize the dust impact on the farms along this section of the road and will reduce the significance of the impact from **moderate (SP = 32)** to **low (SP = 18)**.

### **7.3.8.2 Operations**

The operational phase will not generate heavy vehicle volumes when compared to the construction phase and the impact will be of a **low** significance (**SP = 16**) before and after mitigation.

### **7.3.8.3 Closure and Rehabilitation**

The traffic activities will be similar to those of the construction phase, but by the time of closure, it is highly likely that the traffic will have an impact of **moderate (SP = 40)** significance, which can be mitigated to one of **low (SP = 16)** significance by implementing the following recommended mitigation measures:

- Using only vehicles that are in good working condition;
- Ensuring that loaded vehicles are not too heavy for the road surfaces; and
- Appropriate speed limits are enforced by the local Traffic Police.

## **7.3.9 Visual**

### **7.3.9.1 Construction**

The Gariiep Road is an unsurfaced (untarred) road and accordingly dust is typically generated by vehicles travelling along it. The road surface is comprised of material that originates from calcrete and thus fine white dust is mobilised by vehicles moving along the road. Dust generation on the road, however, has in the past proved to be a contentious issue in the context of the construction of the Bokpoort CSP Plant and the large

number of construction vehicles that travelled along the road and which generated large volumes of dust. The objections from local farmers and landowners were centred on the adverse impacts of the depositing of large volumes of fine dust on the vegetation surrounding the road that allegedly greatly reduced the palatability of the vegetation and the overall grazing capacity of the veld. The transport of components of the proposed developments by road would result in a highly significant daily increase in the volume of heavy vehicle traffic along the road, which would last for much of the duration of the construction period. In this context the generation of dust plumes by a large increased volume of heavy vehicle traffic may be perceived as a negative visual intrusion in conjunction with negative perceptions regarding dust-related grazing impacts, as well as road safety concerns.

A different set of receptors to those potentially affected by the development footprint would potentially be exposed to the dust plumes generated by construction traffic along the Gariep Road. If construction traffic approached the development site from the south-east – i.e. from the N8 – a number of farmsteads, including three farmsteads located close to the road, and a greater number along the opposite side of the Orange River – would be exposed to the regular dust plumes generated by construction vehicles. Though not necessarily significant as an impact on its own, the visual intrusion of the dust plumes could be perceived to have significant nuisance value in combination with negative perceptions of adverse effects on vegetation and concerns relating to road safety.

Dust plumes generated along the Transnet Service Road could have a similar visual effect, but apart from a short stretch of the road located close to the Gariep Road. This road is remote from any areas of public access and dust plume-related impacts will be mitigated by the distance factor in a similar manner to dust plumes generated on the development site.

Without mitigation the impact is rated as **moderate** significance (**SP = 44**) and by implementing dust suppression measures, especially on road stretches located within 500 m of households/ farmsteads located close to the access route and enforcing speed limits, the significance of the impact is reduced to **low (SP = 16)**.

The construction site would not be visible to the vast majority of the receptor locations in the study area, and dust plumes generated at the construction site would be unlikely to cause any visual impact for the majority of the study area. The impact is **low (SP = 18)** before mitigation and **low (SP = 16)**, with the following key mitigation measures:

- Clearing of vegetation must be undertaken in a phased manner, so as to prevent the large-scale exposure of soils and substrate that could result in a large visual contrast compared to the surrounding vegetation and the mobilisation of unconsolidated substrate by wind.
- Dust suppression measures must be implemented on the construction site.
- Bulk earthworks must not occur on (forecast) very windy days.

### 7.3.9.2 Closure and Rehabilitation

The generation of dust plumes from closure and rehabilitation at the plant footprint as well as traffic from decommissioning activities are the same as for the construction phase. The impact is **low (SP = 18)** before mitigation and **low (SP = 16)** with the implementation of mitigation measures.

### 7.3.9.3 Cumulative

The proposed powerline route runs near or adjacent to the operational Bokpoort CSP Solar Facility, existing powerline infrastructure, the existing Sishen-Saldanha railway, an existing road and the authorised and approved Project DAO Solar PV Plant. adjacent to the Bokpoort CSP plant, so when viewed from the surrounds it will form part of a visual environment that is already transformed from a natural context, resulting in a **low** significance.

### 7.3.10 Socio-economic<sup>68</sup>

#### 7.3.10.1 Construction

- Employment opportunities – construction of the Project DAO Plant and the 400kV LILO powerline and expansion and upgrade of the Garona Substation will take about 12 – 18 months and provide about 100 to 250 employment opportunities, which has been assessed as a positive **moderate** impact (**SP = +30**) without mitigation and a positive **moderate** impact (**SP = +40**).
- Population influx – as news regarding the proposed project spreads, expectations regarding possible employment opportunities may take root. Consequently, the area surrounding the site may experience an influx of job seekers. On the Remaining Extent of the Farm Bokpoort 390, construction of the Bokpoort I facility has recently been completed and there has been an influx of people and heavy equipment to the south of the project area. The proposed project would similarly result in the influx of potential job seekers to this area. Population influx is rated as a **moderate** impact (**SP = 52**) before mitigation and **moderate** (**SP = 30**) with mitigation.

The following mitigation measures are proposed (for the overall project):

- Appointing one or more Community Liaison Officers to manage the interaction with the neighbouring residents, other members of the public and the authorities.
- If specific skilled positions cannot be sourced within the Local Municipality, they should be sourced at district, province or national level first before looking at international workers.
- Development of recruitment and procurement policies for ACWA Power Project DAO (RF) (Pty) Ltd, Eskom and all Contractors, which include maximising the usage of local service providers and utilisation of local labour should be a key requirement in the tender documentation.
- Launch an awareness/ educational campaign in conjunction with the local municipality and health authority to address the social and health issues in the local communities associated with the influx of foreign workers.
- Communicating information regarding the transport routes, peak operational times, associated hazards and precautionary measures to the Ward councillor as well as any relevant community organisations;
- Ensuring that project information is communicated formally, consistently and responsibly to avoid misunderstandings and the creation of unrealistic expectations.
- Setting up a formal grievance mechanism for the public to lodge issues. All complaints must be recorded, followed up and resolved as expeditiously as possible.
- Preventing the development of ad-hoc roadside dwellings, shops and so forth on or adjacent to the project site.
- Limiting construction-related road use to daylight hours and avoiding the movement of heavy vehicles during peak traffic hours as far as practicable.
- Developing a database of local job seekers, with skills levels and employment history, before commencing with personnel recruitment for the operational phase.

#### 7.3.10.2 Operations

Maintenance work may be undertaken by contractors employed by Eskom, and in compliance with the EMPs and Eskom Standard Operating Procedures.

#### 7.3.10.3 Cumulative

Employment opportunities – the combined project indicates employment opportunities for approximately 400 local unskilled workers during construction peak. Although it is uncertain at this stage, what the duration of the construction peak will be, 400 local employment opportunities will contribute significantly to livelihoods

<sup>68</sup> Smith, T; de Waal, D. 2016. Socio-economic Impact Assessment for the proposed 75 MW Photovoltaic (PV2) Solar Facility (Bokpoort II Solar Development). Golder Associates Africa (Pty) Ltd.

and the local economy. This conclusion is based on the assumption that by far the majority (if not all) of the 400 opportunities will be sourced from the local communities, focused on Groblershoop and Wegdraai, and other communities within a radius of 20 to 30km from the site. Using local employees must be a key focus area, if the positive impacts are to be maximised. The use of local employees also minimises the range of potential adverse social impacts, such as cultural disparity between local people and large numbers of newcomers, social mobilisation to protect local jobs and health, safety and security concerns. Even though the number of direct job opportunities will be temporary, there is the potential for increased indirect employment through the supply chain vendors and service providers and associated increased local spend as a result of the project activities.

Population influx – the influx of temporary workers in search of jobs is a reality in the Northern Cape. It has significant impacts to the existing communities based on limited available resources to service a larger population in a stark and arid landscape. An impact directly linked to foreign workers, is related to social and intimate relations between the foreigners, who are here for only a short duration, and the local population. This often results in family stress, health impacts, and the socio-economic load on households to look after children, whose fathers have departed and make little contribution to their emotional and financial upkeep. Although any influx of workers into the area may result in such impacts, experience has shown that this is most prominent in the case of foreign workers.

Continued economic benefits – The use of renewable energy resources like solar power contributes to diversifying the fuel sources used for energy production which improves electricity production efficiency.

## 7.4 Summary of Environmental Impacts

### 7.4.1 Construction Phase

Table 7-3 below summarises those impacts directly related to the construction phase of the proposed project and provides a significance rating for each impact before and after mitigation. The construction period for Project DAO PV Plant and LILO powerline and expansion and Upgrade of the Garona Substation is estimated to be 12 - 18 months.

**Table 7-3: Environmental impact assessment matrix for the construction phase**

Potential Environmental Impact (Construction)	Environmental Significance											
	Pre-mitigation						Post-mitigation					
	M	D	S	P	SP	Rating	M	D	S	P	SP	Rating
<b>Soils and Agricultural Potential</b>												
Agricultural grazing land directly occupied by the development infrastructure which includes all associated infrastructure, will become unavailable for agricultural use.	2	4	1	5	35	Mod	2	4	1	5	35	Mod
Soil degradation erosion, topsoil loss and contamination.	2	3	1	3	18	Low	2	3	1	2	12	Low
<b>Water Resources</b>												
The surface and groundwater quality can be impacted by spillage of fuels, lubricants, chemicals from construction equipment, vehicles and temporary workshop during the construction phase.	4	2	2	3	24	Low	2	2	2	2	12	Low
<b>Ecology</b>												
Additional loss of natural vegetation, alien plant invasion and further habitat fragmentation.	2	5	1	3	24	Low	0	5	1	3	18	Low
Loss of Species of Conservation Concern.	4	5	3	2	24	Low	2	5	2	2	18	Low

Potential Environmental Impact (Construction)	Environmental Significance											
	Pre-mitigation						Post-mitigation					
	M	D	S	P	SP	Rating	M	D	S	P	SP	Rating
Anthropogenic disturbances, intentional and/ or accidental killing of fauna.	6	5	1	2	24	Low	4	5	1	2	20	Low
<b>Avifauna</b>												
The removal and/ or destruction and/ or alteration of habitat used by birds, may impact on the foraging and/ or breeding success of certain species, and will lead to numerous birds being displaced from the projects site and needing to find suitable available habitat elsewhere.	8	4	2	5	70	Mod	8	3	1	5	60	Mod
Birds are disturbed and displaced from the project site and surrounding areas due to construction activities and associated noise etc.	8	2	2	4	48	Mod	6	2	2	3	30	Mod
<b>Air Quality</b>												
Emissions from construction activities (e.g. movement of vehicles, preparation of site for construction etc.)	6	2	2	3	30	Mod	6	2	2	2	20	Low
<b>Heritage</b>												
No sites, features or objects of cultural significance were identified.	-	-	-	-	-	-	-	-	-	-	-	-
<b>Palaeontology</b>												
Disturbance, damage, destruction or sealing-in of scientifically important fossil remains preserved at or beneath the ground surface within the development area, most notably by surface clearance and bedrock excavations during the construction phase.	2	5	1	2	16	Low	2	5	1	1	8	Low



Potential Environmental Impact (Construction)	Environmental Significance											
	Pre-mitigation						Post-mitigation					
	M	D	S	P	SP	Rating	M	D	S	P	SP	Rating
<b>Traffic</b>												
The increase in traffic, and especially of vehicles carrying heavy loads will cause an increase in deterioration of the road network.	8	2	2	5	60	Mod	4	2	2	3	24	Low
Increase in dust is only applicable to the gravel roads. Dust is generated due to heavy vehicles and high speeds.	8	2	2	5	60	Mod	2	2	2	3	18	Low
Increase in traffic volumes impacting LOS of the infrastructure:	8	2	2	5	60	Mod	2	2	2	4	24	Low
Road safety deterioration due to dust and speeding, causing drivers to lose control on the gravel roads.	4	2	2	4	32	Mod	2	2	2	3	18	Low
<b>Visual</b>												
Visibility and dust plumes generated at the construction site.	6	2	3	4	44	Mod	4	2	2	2	16	Low
Generation of dust plumes from construction traffic on the access roads.	4	2	3	2	18	Low	4	2	2	2	16	Low
<b>Socio-economic</b>												
Employment opportunities.	6	2	2	3	+30	Mod	6	2	2	4	+40	Mod
Population influx.	8	3	2	4	52	Mod	6	2	2	3	30	Mod

### 7.4.2 Operations Phase

Table 7-4 below summarises those impacts directly related to the operations phase of the proposed project and provides a significance rating for each impact before and after mitigation. The operational period is 30 years.

**Table 7-4: Environmental impact assessment matrix for the operations phase**

Potential Environmental Impact (Operations)	Environmental Significance											
	Pre-mitigation						Post-mitigation					
	M	D	S	P	SP	Rating	M	D	S	P	SP	Rating
<b>Ecology</b>												
Spread of alien invasive plant species.	6	3	1	3	30	Mod	2	2	1	3	15	Low
<b>Avifauna</b>												
Birds are disturbed and displaced from the project site and surrounding areas, or from the grid connection servitude and surrounding areas, due ongoing operational and maintenance activities.	8	4	2	4	56	Mod	6	4	2	2	24	Low
Birds colliding with infrastructure.	10	4	4	5	90	High	6	4	2	2	24	Low
Electrocution of birds perching or attempting to perch on electrical structures.	10	4	4	4	72	Mod	6	4	2	2	24	Low
The development forms a physical barrier to movement of birds across the landscape, alters migration routes and increases distances travelled and energy expenditure for hunting or foraging.	6	4	3	3	39	Mod	4	4	2	2	20	Low
<b>Air Quality</b>												
Areas left exposed after construction can results in emissions of PM particularly during periods of high wind	2	4	2	2	16	Low	2	4	2	2	16	Low



Potential Environmental Impact (Operations)	Environmental Significance											
	Pre-mitigation						Post-mitigation					
	M	D	S	P	SP	Rating	M	D	S	P	SP	Rating
speeds, or due to wheel entrainment of PM if vehicles travel over these areas.												
Vehicles travelling to and from the site will emit PM and gases.	2	4	2	5	40	Mod	2	4	2	5	40	Mod
<b>Traffic</b>												
Deterioration of road conditions, dust generation, traffic volumes and road safety conditions during the operations phase.	2	4	2	2	16	Low	2	4	2	2	16	Low

### 7.4.3 Closure and Rehabilitation

Table 7-5 below summarises those impacts directly related to the operations phase of the proposed project and provides a significance rating for each impact before and after mitigation. The closure and demolition of the infrastructure will take approximately 3 - 6 months. The rehabilitation period to restore the area to grazing will be approximately 6 - 12 months.

**Table 7-5: Environmental impact assessment matrix for the closure and rehabilitation phase**

Potential Environmental Impact (Closure & Rehabilitation)	Environmental Significance											
	Pre-mitigation						Post-mitigation					
	M	D	S	P	SP	Rating	M	D	S	P	SP	Rating
<b>Soils</b>												
Soil degradation can result from erosion, topsoil loss and contamination.	2	2	1	3	15	Low	2	2	1	2	10	Low

Potential Environmental Impact (Closure & Rehabilitation)	Environmental Significance											
	Pre-mitigation						Post-mitigation					
	M	D	S	P	SP	Rating	M	D	S	P	SP	Rating
<b>Water Resources</b>												
The surface and groundwater quality can be impacted by spillage of fuels, lubricants, chemicals from closure and rehabilitation activities.	6	1	1	3	24	Low	2	1	1	3	12	Low
<b>Ecology</b>												
Spread of alien invasive plant species.	6	1	1	3	24	Low	4	2	2	2	16	Low
<b>Air Quality</b>												
Ambient pollutant concentrations and nuisance dustfall rates will increase during the decommissioning period.	2	1	2	3	15	Low	2	1	1	3	12	Low
<b>Traffic</b>												
Significantly less traffic than construction and operational phases but will have some effect on road safety and wear and tear.	6	2	2	4	40	Mod	4	2	2	2	16	Low
<b>Visual</b>												
Generation of dust plumes from traffic on the access roads.	4	2	3	2	18	Low	4	2	2	2	16	Low

#### 7.4.4 Cumulative

Table 7-6 below summarises those impacts directly related to the construction phase of the proposed project and provides a significance rating for each impact before and after mitigation.

**Table 7-6: Summary of cumulative impacts**

Discipline	Impact and Significance
<b>Agriculture</b>	<p>Loss or degradation of agricultural land, with a consequent decrease in agricultural production.</p> <p>The cumulative impact of loss of agricultural land use is assessed as having low significance.</p>
<b>Ecology</b>	<p>This type of development on the biodiversity indicates that none of the anticipated impacts can be highlighted or construed to represent an unacceptable or severe threat to sensitive biodiversity within the development footprint, however it does form part of a larger development and the cumulative impacts associated with every phase of this development does have a significant impact to the biodiversity in the greater area.</p> <p>A biodiversity offset has therefore been mandated for the Project DAO PV development, to ensure that all residual impacts associated with the development as a whole are adequately compensated, the offset area calculation has included all aspects/ phases of the project including the expansion of the Garona Substation.</p>
<b>Avifauna</b>	<p>The proposed 400kV LILO powerline route is relatively short and runs in close proximity to existing and authorised infrastructure. In the immediate vicinity, the proposed powerline route runs near or adjacent to the operational Bokpoort CSP Solar Facility, existing powerline infrastructure, the existing Sishen-Saldanha railway, an existing road and the authorised and approved Project DAO Solar PV Plant. This position combined with the high levels of existing disturbance on the site make it unlikely that the proposed LILO grid connection route will significantly contribute to an increased cumulative negative impact on local avifauna, particularly with regards to priority species as they are unlikely to be present.</p>
<b>Air Quality</b>	<p>During construction there is some risk that the construction activities could contribute to elevated particulate matter concentrations and nuisance dustfall rates off-site during high wind speed events. Cumulative impacts are likely to be limited in duration and frequency and of low significance with the implementation of mitigation measures mentioned above.</p>
<b>Heritage</b>	<p>The cultural heritage profile of the larger region is very limited and consists of isolated findspots of Stone Age (MSA) tools, farmsteads and burial sites. Consequently, the cumulative impact of the proposed development is viewed to be low significance.</p>
<b>Visual</b>	<p>The proposed powerline route runs near or adjacent to the operational Bokpoort CSP Solar Facility, existing powerline infrastructure, the existing Sishen-Saldanha railway, an existing road and the authorised and approved Project DAO Solar PV Plant. adjacent to the Bokpoort CSP plant, so when viewed from the surrounds it will form part of a visual environment that is already transformed from a natural context, resulting in a low significance.</p>

Discipline	Impact and Significance
Socio-economic	Potential cumulative impacts include employment opportunities during construction, influx of people into the area seeking employment and continued economic benefits.

## 8 ENVIRONMENTAL IMPACT STATEMENT

### 8.1 Key Findings

#### 8.1.1 Soils and Agricultural Potential

No agricultural sensitive areas occur within the proposed site and no part of it is therefore required to be set aside from the development. Because of the low agricultural potential of the site, and the consequent low agricultural impact, there are no restrictions relating to agriculture which would preclude authorisation of the proposed development.

#### 8.1.2 Water Resources

Spillage of fuels, lubricants and other chemicals must be cleaned up immediately and disposed of at an appropriately licenced landfill site. Mitigation for spillage or leakages must include bunded areas to store chemicals and/ or fuel.

#### 8.1.3 Ecology

A review of the biodiversity on site and the anticipated impacts associated with this type of development on the biodiversity indicates that none of the anticipated impacts can be highlighted or construed to represent an unacceptable or severe threat to sensitive biodiversity within the development footprint. This development does however form part of a larger development and the cumulative impacts associated with every phase of this development does have a significant impact to the biodiversity in the greater area.

There will be a substantial loss of SCC as a result of the Project DAO PV development in its entirety, most notably the number of *Boscia albitrunca* trees that will be lost. Although the expansion of the Garona Substation will result in an insignificant number of SCC being lost as a direct result of the development the cumulative impact of the loss of protected trees as a result of the whole solar development should be considered. Although *B. albitrunca* is not considered to be in decline and is therefore listed as Least Concern it is listed as a protected species because it is considered a keystone species in the arid parts of South Africa, where it not only provides browse, but shade and microhabitat for other biota (i.e. a close-knit relationship exists between *Boscia albitrunca* and the Brown-veined White butterfly (*Belenois aurota*).

This proposed expansion falls with the Kalahari Karroid Shrubland vegetation type, which is a considerably small vegetation type for the arid region (828 389.89ha) with only 0.1% under formal protection in the Augrabies Falls Nature Reserve. The Bokpoort Solar developments will destroy about ~0.17% of the conservation target, this is approximately what is currently under formal protection. Even though it has a conservation target of 21%, no conservation land has been added to this vegetation unit since 2006. There is a concern that increased impacts on this vegetation unit can result in fragmented islands which can ultimately result in the hindering of ecosystem functions and processes.

A biodiversity offset has therefore been mandated for the Project DAO PV development, to ensure that all residual impacts associated with the development as a whole are adequately compensated, the offset area calculation has included all aspects/ phases of the project including the expansion of the Garona Substation. A Biodiversity Offset Feasibility Investigation has been conducted and the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NCDAERL) have made recommendations.

#### **8.1.4 Avifauna**

- Expansion of the existing Garona Substation:

The area immediately surrounding the existing Garona Substation that would be the focus of the proposed expansion already experiences high levels of existing disturbance. Therefore, any direct habitat loss associated with expansion of the substation would not have a significant negative impact on avifauna in the area, particularly regarding priority species as they have likely already been displaced from the area. Priority species are similarly unlikely to enter the substation yard and therefore impacts associated with collisions or electrocutions caused by electrical infrastructure are unlikely to be significant. The proposal for the expansion of the existing Garona Substation to facilitate the grid connection can therefore be approved from an avifaunal perspective.

- Loop-in-loop-out Route

The position of the proposed LILO overhead powerline infrastructure to loop-in to the existing Ferrum-Garona 400kV powerline and loop-out from the existing Garona–Nieuwehoop 400kV powerline is between a road, railway line and the operational Bokpoort Solar Facility and runs in close proximity to- or adjacent to existing overhead powerline infrastructure. This position combined with the high levels of existing disturbance on the site make it unlikely that the proposed LILO grid connection route will significantly contribute to an increased cumulative negative impact on local avifauna, particularly with regards to priority species as they are unlikely to be present. Additionally, overhead powerlines and towers have the potential to reduce the existing risks to avifauna (such as powerline collisions) by increasing the visibility of the lines to avifauna if suitable line-marking devices (such as BFDs) are used and if new pylons can be positioned in a staggered manner relative to the existing pylons.

#### **8.1.5 Air Quality**

The key pollutant from the proposed site during the construction and decommissioning phases would be PM. Various PM control measures for the construction phase are presented, the key being wet suppression.

#### **8.1.6 Heritage and Palaeontology**

Stone Age lithics dating to the MSA are found only as low-density surface scatters. The low density of the lithic scatters is, on archaeological grounds, viewed to be of low significance and require no further action. No sites, features or objects of cultural significance are known to exist in the development area, and there would be no impact as a result of the proposed development. Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

No significant impacts on fossil heritage are anticipated during the construction, operational and closure phases of the project.

The proposed 400kV LILO powerline and expansion and upgrade of the Garona Substation is expected to have a neutral effect from a palaeontological heritage impact perspective i.e. no advantages or disadvantages are expected.

There are no objections on palaeontological heritage grounds to approval of the proposed development, subject to the conditions and recommendations as stipulated in the original Environmental Authorisation, and according to the EMPs and suggested mitigation measures, as outlined in the original Palaeontological Heritage Assessment Report.



### **8.1.7 Traffic**

The traffic impacts associated with the ten 132kV powerlines as well as the substation presented in Option 2 has been previously assessed and authorised as part of the PV development, the 400kV LILO powerline will replace these 132kV powerlines therefore no additional traffic impacts are envisaged.

### **8.1.8 Visual**

The visual impact from the 400kV LILO powerline and the expansion and upgrade of the Garona Substation will be cumulative to the existing visual transformation of anthropological origin (Bokpoort I installation, farm buildings, powerlines, railway line, roads) and will be present for the operational life of the facility (estimated at 30 years). The impact will be totally reversible upon decommissioning and closure of the solar facility.

### **8.1.9 Socio-economic**

The proposed project will be a positive impact as this will provide further support to the National grid therefore aiding in provide electricity security to the region and the country. The potential job creation at the construction phase of the project will be a positive for the local and regional economy as unemployment in the country is increasing. An assured and diversified electricity generation mix is a key step in attracting investors into South Africa and is key for the growth and development.

## **8.2 Environmental Impact Statement**

The project, in the EAP's opinion, does not pose a detrimental impact on the receiving environment and its inhabitants and potential impacts can be mitigated significantly. There are no fatal flaws prohibiting the project from going ahead.

## **8.3 Cumulative Impact Statement**

When considering the potential impacts of the proposed increase in capacity of the grid connection it is important to not only consider the physical attributes of the grid connection infrastructure but also the position of the route in the context of the landscape, in this case particularly in relation to the existing and authorised infrastructure in the immediate surroundings.

The proposed 400kV LILO powerline route is relatively short and runs in close proximity to existing and authorised infrastructure. In the immediate vicinity, the proposed powerline route runs near or adjacent to the operational Bokpoort CSP Solar Facility, existing powerline infrastructure, the existing Sishen-Saldanha railway, an existing road and the authorised and approved Project DAO Solar PV Plant. This position combined with the high levels of existing disturbance on the site make it unlikely that the proposed LILO grid connection route will significantly contribute to an increased cumulative negative impact.

In addition, the proposed project will be developed within a REDZ (REDZ 7) which is earmarked for large scale solar energy facilities and is within the Northern Corridor Strategic Transmission Corridor. Further to this, the development is preferable, from an impact point of view as well as from practical considerations, to rather have a concentrated node of renewable energy development within one area, than to spread out the same number of developments over a larger area.

### 8.4 Sensitivity Maps

The sensitivity maps overlaid with the layout is presented in Figure 8-1 and Figure 8-2 must be considered when determining if the proposed project should be authorised.

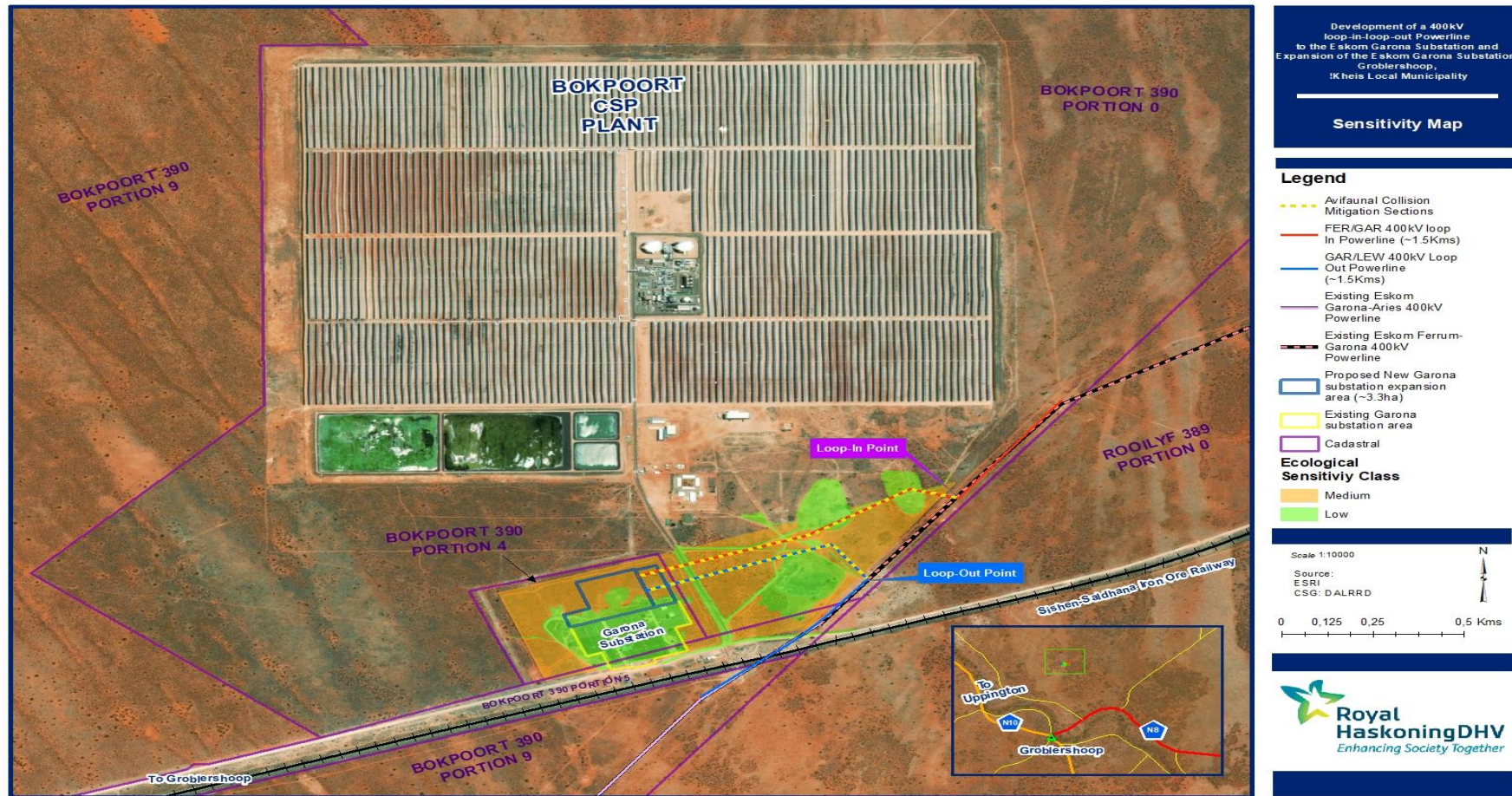


Figure 8-1: Sensitivity map

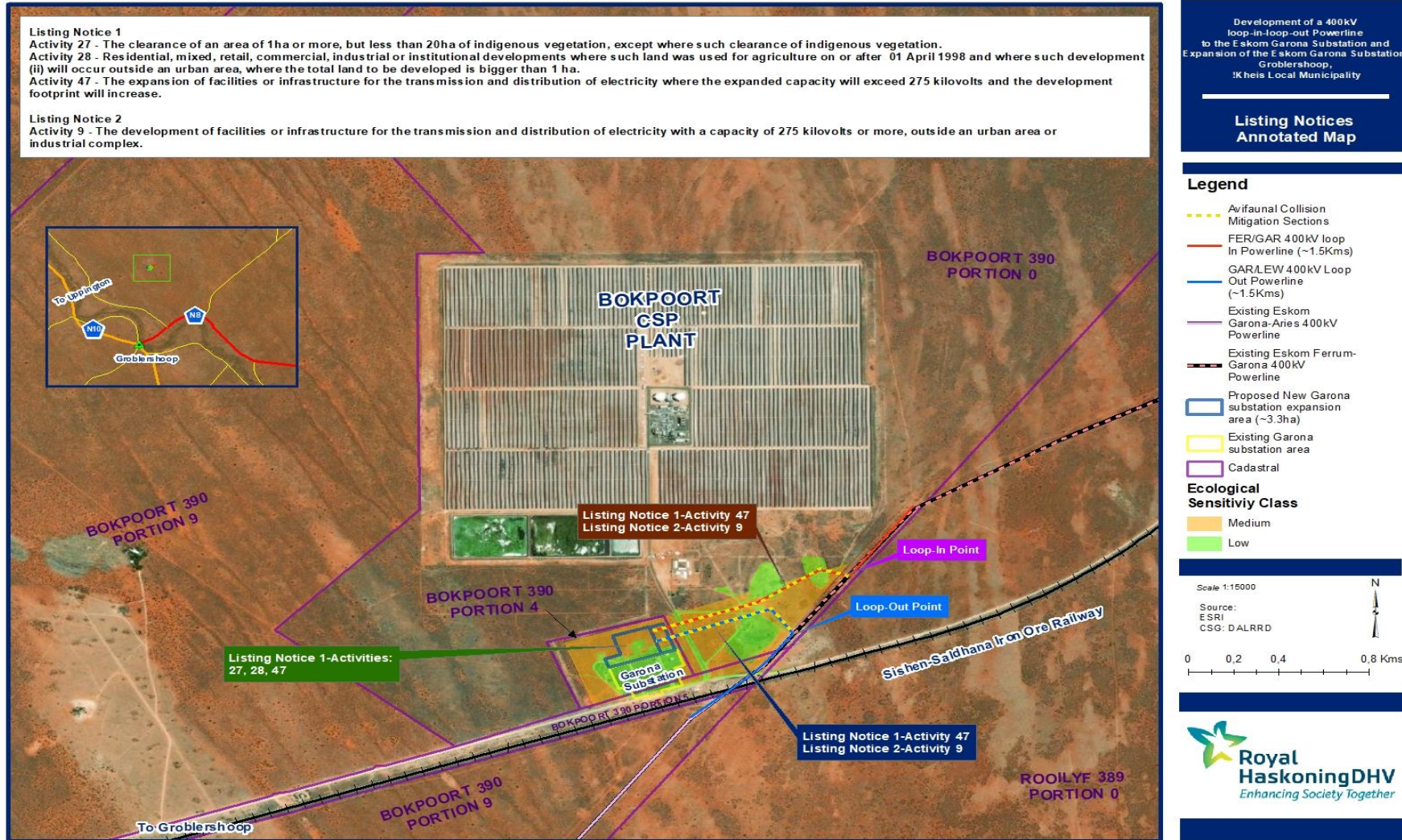


Figure 8-2: Annotated sensitivity map

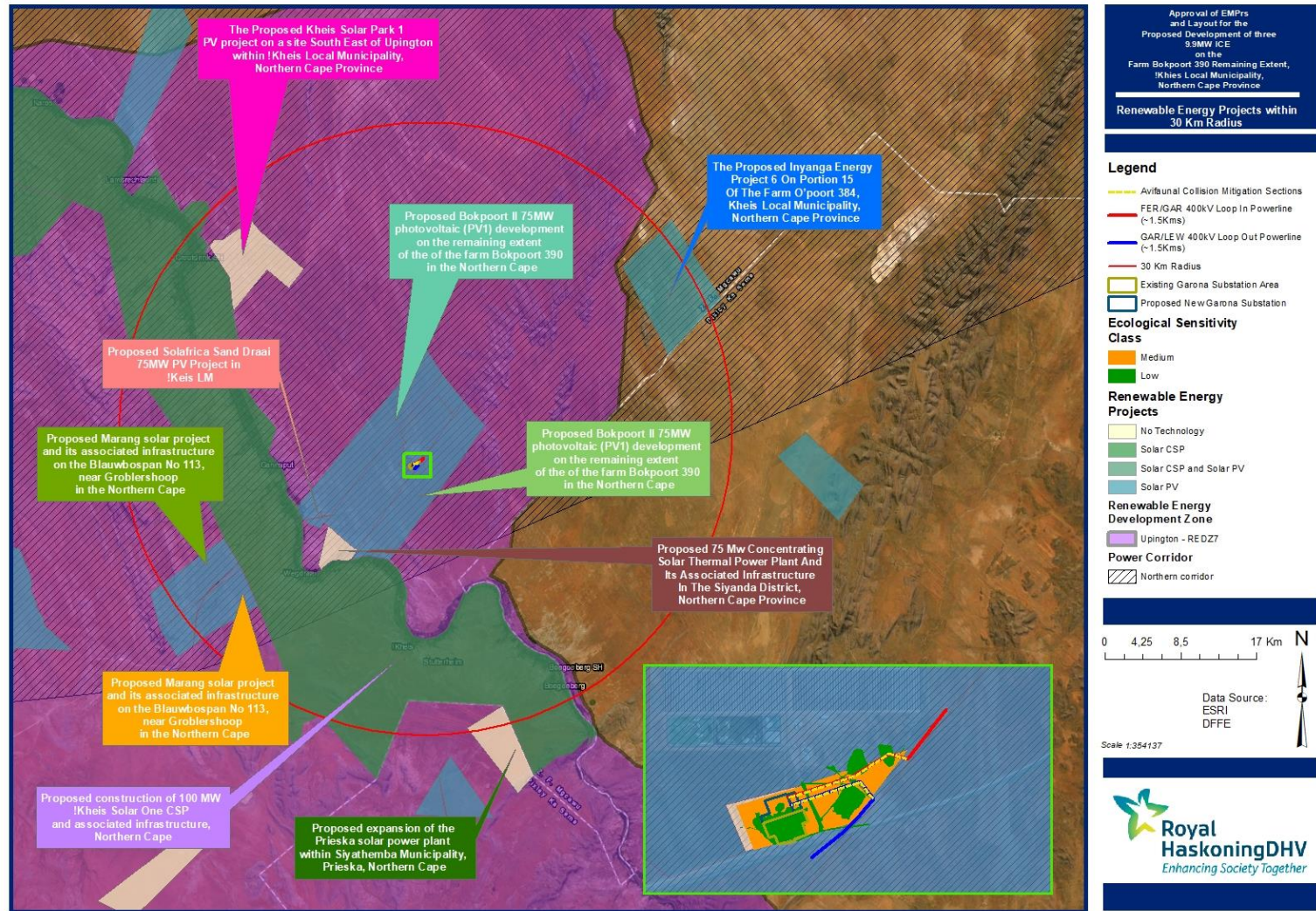


Figure 8-3: Renewable energy projects within 30km radius of the proposed project

## 8.5 Assumptions, Uncertainties or Gaps in Knowledge

The BA study followed the legislated process required and as governed and specified by the EIA Regulations 2014 (as amended). Inevitably, when undertaking scientific studies, challenges and limitations are encountered. For this specific BA, the following should be noted:

- All information provided by the Engineering team, previous studies conducted for the 10 PV plants was correct and valid at the time it was provided.
- Although all effort was made by the project team to identify all environmental social and health aspects, impacts and mitigation measures, errors and omissions may have occurred.
- The EAP does not accept any responsibility in the event that additional information comes to light at a later stage of the process.
- All data from unpublished research is valid and accurate.
- The BA study does not address Occupational Health and Safety as required by IFC Performance Standard 2. ACWA Power Project DAO (RF) (Pty) Ltd has established health and safety policies and procedures for Bokpoort I and will develop appropriate environmental, health, safety, security and quality control procedures applicable to the development prior to the commencement of construction.
- Every effort was made to engage I&APs and stakeholders, however not every I&AP and stakeholder may have been consulted. A grievance mechanism must be put in place at the commencement of construction through which I&APs and stakeholders are able to raise grievances and continue to contribute their concerns and issues with the project team.

## 8.6 Recommendations

### 8.6.1 Recommendations to the CA

Option 1 is the most feasible due to risk and safety factors as two 400kV substations may not be constructed in close proximity to each other as the Garona Substation and the proposed new Project DAO substation are located within a distance of 1.6km to each other. In addition to this, Eskom has planned for the expansion and upgrade of the Garona Substation which will accommodate all future growth in terms of the electricity generated by the successful bidders within this area. Construction is expected to commence by October 2021 for 12 - 18 months. An EA with a validity of 10 years is recommended and construction and construction and post-construction monitoring activities will be concluded by 31 August 2031.

The Applicant must be bound to stringent conditions to maintain compliance and a responsible execution of the project.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this BA study are included within the EMPs (**Appendix E & F**). The EMPs must be used to ensure compliance with environmental specifications and management measures.

The implementation of the EMPs for the construction phase of the project is considered to be vital in achieving the appropriate environmental management standards as detailed for this project.

In addition, the following key conditions should be included as part of the authorisation:

- a) The Developer is not negated from complying with any other statutory requirements that is applicable to the undertaking of the activity. Relevant key legislation that must be complied with by the proponent includes *inter alia*:
  - i. Provisions of the National Environmental Management Waste Act (Act No. 59 of 2008) (as amended);

- ii. Provisions of the National Water Act, 1998 (Act No. 36 of 1998) (as amended); and
- iii. National Heritage Resources Act (Act No. 25 of 1999).
- b) The Developer must appoint a suitably experienced (independent) Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation/ rehabilitation measures and recommendations are implemented and to ensure compliance with the provisions of the EMPs.
- c) All other necessary permits, licences and approvals must be obtained prior to the commencement of construction.
- d) Prior to site clearance, a detailed 'walkthrough' must be conducted of the proposed site to ascertain the number, abundance and physical conditions of all protected tree species to assist with permit applications (DFFE).
- e) Prior to site clearance, a detailed 'walkthrough' must be conducted of the proposed site to ascertain the number, abundance and physical conditions of all protected plant to assist with permit applications (Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform).
- f) A construction and operational phase bird monitoring programme must be implemented by a bird specialist, to document potential impacts on key species such as korhaans, bustards and eagles.
- g) Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
- h) A Biodiversity Offset Feasibility Investigation has been conducted and the recommendations by the NCDAERL must be taken into account.

### 8.6.2 Recommendations to the Applicant

The Applicant must adhere to the recommendations provided by the specialists and the EAP. The EMPs summarises these recommendations. The Applicant must take full responsibility for the execution of the project in a manner which does not negatively impact on the environment by ensuring that responsible decisions are made.

### 8.7 Oath and Declaration by the EAPs

The following is hereby affirmed by the EAPs to be included in this report:

- the correctness of the information provided in the reports;
- the inclusion of all comments and inputs from stakeholders and I&APs;
- the inclusion of all inputs and recommendations from the specialist reports where relevant; and
- any information provided by the EAPs to I&APs and any responses by the EAPs to comments or inputs made by interested and affected parties.



Signed: Seshni Govender (*Pr Sci Nat*)



Signed: Prashika Reddy (EAPASA, *Pr Sci Nat*)

CERTIFIED TRUE COPY OF THE  
ORIGINAL

**Malcolm Roods**

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23/05/2021





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