KHUNAB SOLAR GRID CONNECTION FOR KHUNAB SOLAR DEVELOPMENT

Northern Cape Province

Final Basic Assessment Report

February 2020

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PROJECT DETAILS

Title	:	Basic Assessment Process: Basic Assessment Report for the Khunab Solar Grid Connection, Northern Cape Province
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Report Revision	:	Final Basic Assessment Report for submission to DEA for decision making
Date	:	February 2020

When used as a reference this report should be cited as: Savannah Environmental (2020) Final Basic Assessment Report for the Khunab Solar Grid Connection, Northern Cape Province.

PURPOSE OF THE BASIC ASSESSMENT REPORT AND INVITATION TO COMMENT

McTaggarts PV1 (Pty) Ltd has appointed Savannah Environmental as the independent environmental consultant to undertake the Basic Assessment (BA) for the Khunab Solar Grid Connection, Northern Cape. The project development site is located within the Upington Renewable Energy Development Zone (REDZ) and within the northern corridor of the Strategic Transmission Corridors. The BA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This Basic Assessment (BA) report represents the findings of the BA process and contains the following chapters:

- **Chapter 1** provides background to the proposed Khunab Solar Grid Connection and the basic assessment process.
- **Chapter 2** provides a description of the project details.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the grid connection.
- **Chapter 5** describes the need and desirability for the development of the Khunab Solar Grid Connection within the grid connection corridor.
- **Chapter 6** outlines the approach to undertaking the basic assessment process.
- **Chapter 7** describes the existing biophysical and social environment within and surrounding the grid connection corridor proposed for the development.
- **Chapter 8** provides an assessment of the potential issues and impacts associated with the development of the grid connection solution and presents recommendations for the mitigation of significant impacts.
- **Chapter 9** provides an assessment of the potential for cumulative impacts.
- **Chapter 10** presents the conclusions and recommendations based on the findings of the BA Report.
- **Chapter 11** provides references used in the compilation of the BA Report.

The BA report was made available for review from **15 January 2020 – 14 February 2020** at the following locations:

- Dawid Kruiper Public Library, Cnr Mark & Mutual Street, Upington
- Keimoes Library Hall, Cnr Loop & Keimoes Streets, Keimoes
- https://www.savannahsa.com/public-documents/energy-generation/

EXECUTIVE SUMMARY

McTaggarts PV1 (Pty) Ltd proposes the construction and operation of a grid connection solution for the proposed McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and Klip Punt PV1 solar PV facilities, collectively known as the Khunab Solar Development, near Upington in the Northern Cape Province. The Khunab Solar grid connection project provides a grid connection solution for the four solar PV facilities to connect to the Upington Main Transmission Substation (MTS), and will include the development of two collector substations (each including a switching station component), as well as a single circuit power line. The collector substations will be known as the Khunab Collector Substation and the Klip Punt Collector Substation. Other associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays, a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.

A corridor 300m wide and 13km long is being assessed to allow for the optimisation of the grid connection infrastructure layout and to accommodate environmental sensitivities. The assessed grid connection corridor is located within the Upington Renewable Energy Development Zone (REDZ), and within the northern corridor of the Strategic Transmission Corridors. The grid infrastructure (including a 132kV power line and two collector substations) will be developed within the assessed 300m wide corridor (known as the grid connection corridor) (**Figure 1**).

The full length of the assessed 300m wide corridor traverses three affected properties, namely:

» Portion 3 of McTaggart's Camp No. 453;
» Portion 12 of Klip Punt 452; and
» Olyvenhouts Drift Settlement Agricultural Holding 1080.

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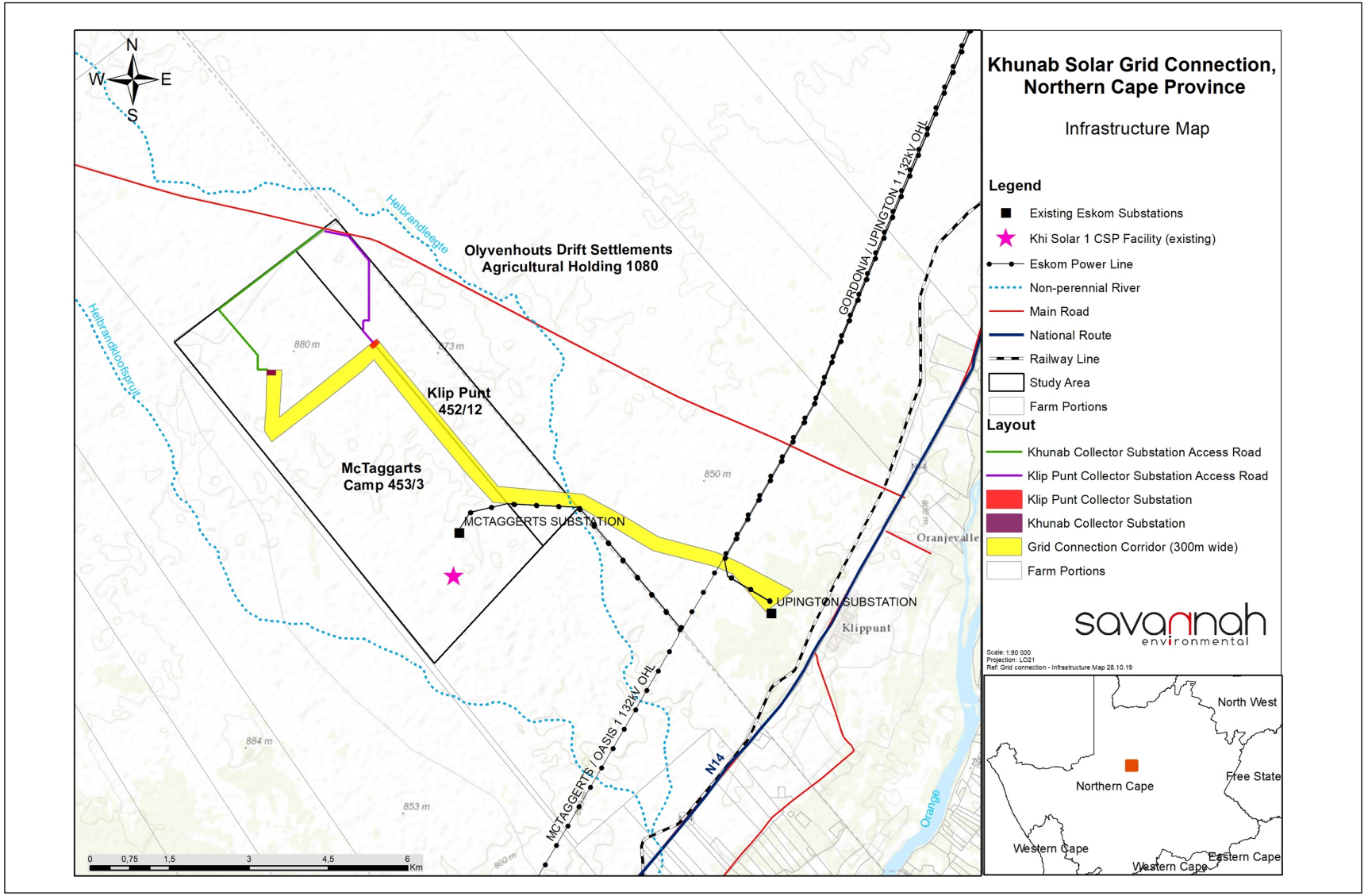

Figure 1: Grid connection corridor, including the grid infrastructure

No environmental fatal flaws were identified in the detailed specialist studies conducted for the Khunab Solar Grid Connection. All impacts associated with the project establishment within the grid connection corridor can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures.

The potential environmental impacts associated with the Khunab Solar Grid Connection identified and assessed through the BA process include:

Ecological Impacts - From the findings of the Ecological Impact Assessment it can be concluded that the grid connection corridor assessed for the development of the grid connection infrastructure is of low ecological sensitivity. As a result, there are no specific long-term impacts associated with the grid connection infrastructure that cannot be reduced to an acceptable level through mitigation and avoidance. There are no high residual impacts or fatal flaws associated with the development and it can be supported from a terrestrial ecology perspective. The specialist has indicated that the Khunab Solar Grid Connection should be authorised, from an ecological perspective, and subject to the implementation of the recommended mitigation measures.

Avifauna Impacts - From the results of the avifauna assessment, it can be concluded that with the implementation of the recommended mitigation measures, the risks and mortalities expected with the development of the grid connection infrastructure can be reduced to acceptable levels. No long-term impacts of a high significance are expected, and no fatal flaws were identified from an avifauna perspective. The specialist has indicated that the Khunab Solar Grid Connection should be authorised, and subject to the implementation of the recommended mitigation measures.

Impacts on Land Use, Soil and Agricultural Potential – The identified impacts include soil chemical pollution, loss of potentially productive agricultural land, and increased soil erosion by wind due to disturbance of the soil. These impacts are expected during the construction and operation phases and can be mitigated to be within low and acceptable levels of impact considering the characteristics and potential of the soils present within the grid connection corridor and the lack of productive agricultural land. No fatal flaws have been identified from a soils and agricultural potential perspective. Therefore, the specialist has indicated that the development of the Khunab Solar Grid Connection is considered to be acceptable from a soils and agricultural perspective.

Impacts on Heritage Resources – No fatal flaws have been identified from a heritage perspective. The significance of the impacts will be low, and no recommended mitigation measures are applicable. No heritage impacts of high significance are expected, and the development of the grid connection infrastructure is considered to be acceptable.

Visual Impacts - The impacts include visual impacts due to construction activities, as well as impacts on sensitive visual receptors located within 0.5km to 3km from the grid connection infrastructure, and a visual impact on the sense of place. The Visual Impact Assessment concluded that the visual impact of the grid connection infrastructure would be most significant within a 3km radius from the infrastructure. The significance of the impacts will, however, be low, with the implementation of the recommended mitigation measures. No impacts of a high significance are expected to occur.

Social Impacts - The development of the grid connection infrastructure will be associated with positive and negative social impacts of medium significance during the construction, operation and decommissioning phases. Best practice measures for the project must be implemented in all phases. The social impacts are considered to be acceptable and negative impacts can be reduced to acceptable levels.

Cumulative Impacts - The development of the grid infrastructure for the Khunab Solar Grid Connection and its contribution to the overall impact of existing grid connection infrastructure within the vicinity of the proposed Khunab Solar Grid Connection, it can be concluded that the contribution of the project to cumulative impacts will range from low significance to medium significance, depending on the impact being considered. There are, however, no identified impacts considered as presenting an unacceptable risk. In addition, no impacts that will result in whole-scale change are expected.

Figure 2 provides an environmental sensitivity map of the grid connection corridor assessed as part of the BA process, as well as the environmental sensitivities identified.

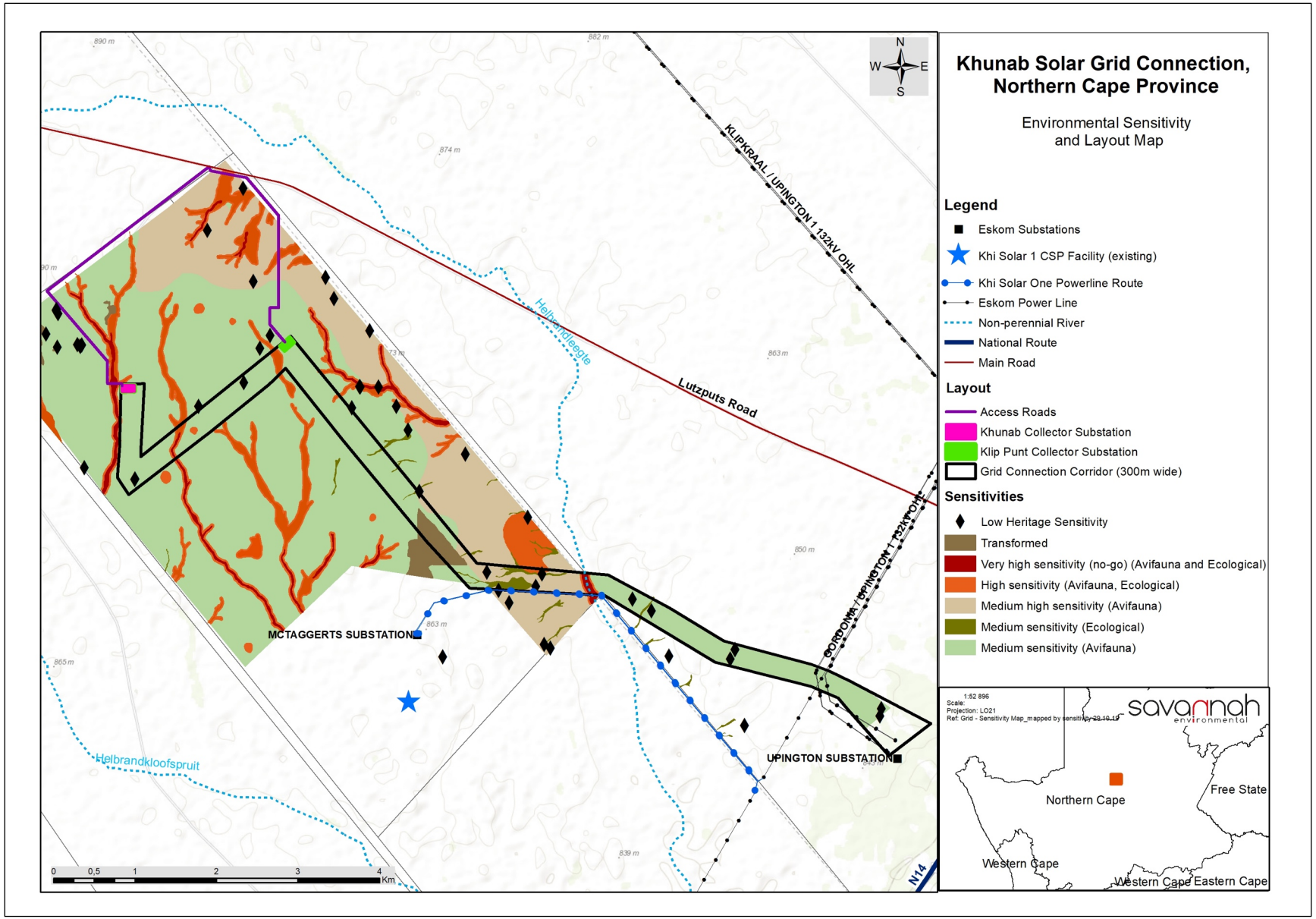

Figure 2: Environmental sensitivity map overlain with the assessed grid connection corridor within which the grid connection infrastructure is proposed to be developed

DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

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

Environmental Authorisation (EA): means the authorisation issued by a competent authority (Department of Environmental Affairs) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.

Environmental assessment practitioner (EAP): An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Environmental impact: An action or series of actions that have an effect on the environment.

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

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

Environmental Officer (EO): The Environmental Officer (EO), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. The EO must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: 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.

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

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

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

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

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

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

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

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

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

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

Waste: means— Any substance, whether or not that substance can be reduced, re-used, recycled and recovered-

(a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;
(b) which the generator has no further use of for the purposes of production;
(c) that must be treated or disposed of; or
(d) that is identified by the Minister by notice in the Gazette.

and includes waste generated by the mining, medical or other sector, but –

(i) a by-product is not considered waste; and

any portion of waste once re-used, recycled and recovered, ceases to be waste.

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CHAPTER 1: INTRODUCTION

McTaggarts PV1 (Pty) Ltd proposes the construction and operation of a grid connection solution for the proposed McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and Klip Punt PV1 solar PV facilities, collectively known as the Khunab Solar Development, near Upington in the Northern Cape Province. The Khunab Solar Grid Connection will connect the four solar PV facilities to the Upington Main Transmission Substation (MTS) and will include the development of two collector substations, each including a switching station component, and a single circuit power line. The collector substations will be known as, the Khunab Collector Substation[1] and the Klip Punt Collector Substation[2]. Other associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays, a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.

The two collector substations will collect the electricity from the respective solar PV facilities. The switching station located within each collector substation will step up the current from 22kV or 33kV to 132kV, to allow for the distribution of power to the Upington MTS. A 300m wide grid connection corridor (which increases to ~700m at the Upington MTS with a total length of 13km is being assessed to allow for the optimisation of the grid connection solution and the associated infrastructure, and to accommodate sensitive environmental features located within the corridor. The grid connection infrastructure will be developed within the grid connection corridor. The height of the power line towers will be up to 32m and will be located within a servitude of up to 36m.

The grid connection corridor traverses three affected properties, namely:

- Portion 3 of McTaggarts Camp 453;
- Portion 12 of Klip Punt 452; and
- Olyvenhouts Drift Settlement Agricultural Holding 1080
-

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

- **Chapter 1** provides background to the proposed Khunab Solar Grid Connection and the basic assessment process.
- **Chapter 2** provides a description of the project details.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the grid connection.
- **Chapter 5** describes the need and desirability for the development of the Khunab Solar Grid Connection within the grid connection corridor.

[1] The Khunab Collector Substation (including the switching station component) will facilitate a connection from McTaggarts PV2 and McTaggarts PV3 to the national grid and will be located on Portion 3 of McTaggarts Camp 453.

[2] The Klip Punt Collector Substation (including the switching station component) will facilitate a connection from McTaggarts PV1 and Klip Punt PV1 to the national grid and will be located on Portion 3 of McTaggarts Camp 453 and Portion 12 of Klip Punt 452.

- **Chapter 6** outlines the approach to undertaking the basic assessment process.
- **Chapter 7** describes the existing biophysical and social environment within and surrounding the grid connection corridor proposed for the development.
- **Chapter 8** provides an assessment of the potential issues and impacts associated with the development of the grid connection solution and presents recommendations for the mitigation of significant impacts.
- **Chapter 9** provides an assessment of the potential for cumulative impacts.
- **Chapter 10** presents the conclusions and recommendations based on the findings of the BA Report.
- **Chapter 11** provides references used in the compilation of the BA Report.

1.1 Requirements for a Basic Assessment Process

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

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

Due to the triggering of Activity 11(i) of Listing Notice 1, of the EIA Regulations, 2014 (as amended), a Basic Assessment process must be undertaken in order to obtain Environmental Authorisation for the construction and operation of the Khunab Solar Grid Connection. The grid connection corridor is also located within the northern corridor of the Strategic Transmission Corridors and the Upington Renewable Energy Development Zone (REDZ 7), gazetted on 16 February 2018 (GNR113 and GNR114). These transmission corridors are considered to be of strategic importance for the rollout of large-scale electricity transmission and distribution infrastructure in terms of Strategic Integrated Project 10: Electricity Transmission and Distribution.

McTaggarts PV1 (Pty) Ltd appointed Savannah Environmental as the independent environmental consultant to conduct the BA process for the grid connection solution. This BA Report is also undertaken in line with Appendix 1 of the EIA Regulations, 2014 (as amended).

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

The BA process is comprised of one phase and involves the identification and assessment of environmental impacts through specialist studies, as well as public participation. The process followed in the BA involves a

detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative). This includes detailed specialist investigations and one round of public consultation. Following the public review period of the BA Report and Environmental Management Programme (EMPr[3]), a final BA Report and an EMPr is submitted to the Competent Authority, which includes the recommendations for practical and achievable mitigation and management measures for final review and decision-making.

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

In terms of GNR 779 of 01 July 2016, the National Department of Environmental Affairs[4] (DEA), has been determined as the Competent Authority for all projects which relate to the Integrated Resource Plan for Electricity (IRP) 2010 – 2030, and any updates thereto. Through the decision-making process, the DEA will be supported by the Northern Cape Department of Environment and Nature Conservation (DENC) as a commenting authority.

The nature and extent of the Khunab Solar Grid Connection, as well as potential environmental impacts and mitigation associated with the construction, operation and decommissioning phases of a development of this nature are explored in more detail in this BA Report.

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

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

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

Requirement	Relevant Section
3(a) the details of the (i) EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details of the EAP who prepared the report and the expertise of the EAP is included in section 1.5. The curriculum vitae of the EAP, project team and independent specialists are included in **Appendix A**.

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

[4] The Department of Environmental Affairs (DEA) is soon to become the Department of Environment, Forestry and Fisheries (DEFF), which is an amalgamation of the DEA as well as the Department of Agriculture, Forestry and Fisheries (known as DAFF).

3(b) the location of the activity including (i) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties.	The location of the grid connection corridor, within which the 132kV power line and collector substations will be developed, is included in section 1.3, **Table 1.1** and **Figure 1.1**. The information provided includes the 21-digit Surveyor General code of the affected properties and the farm names. Additional information is also provided regarding the location of the development which includes the relevant province, local and district municipalities, ward and current land zoning.

1.3 Overview of the Khunab Solar Grid Connection

The Khunab Solar Development is proposed to be part of the Department of Energy's[5] (DoE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme and is expected to be bid in the next available bidding window. In order for the project to evacuate the generated solar power from the four individual solar PV facilities to the national grid, a connection must be established between the facilities and the national grid connection point. The Khunab Solar Grid Connection is considered to be the grid connection solution for the Khunab Solar Development and includes the development of specific grid connection infrastructure in order to enable the connection. The infrastructure includes:

- two (2) collector substations (known as the Khunab Collector Substation and Klip Punt Collector Substation), each including a switching station component;
- a single-circuit 132kV overhead power line; and
- associated infrastructure such as access roads, feeder bays, a fibre and optical ground wire (OPGW) layout, insulation and assembly structure

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

The full length of the assessed 300m wide corridor traverses three affected properties, namely:
- Portion 3 of McTaggarts Camp 453;
- Portion 12 of Klip Punt 452; and
- Olyvenhouts Drift Settlement Agricultural Holding 1080

The key infrastructure components proposed as part of the project are described in greater detail in Chapter 2 of this BA Report.

[5] The Department of Energy is soon to be the Department of Mineral Resources and Energy, which is an amalgamation of the Department of Energy (DoE) and the Department of Mineral Resources (DMR).

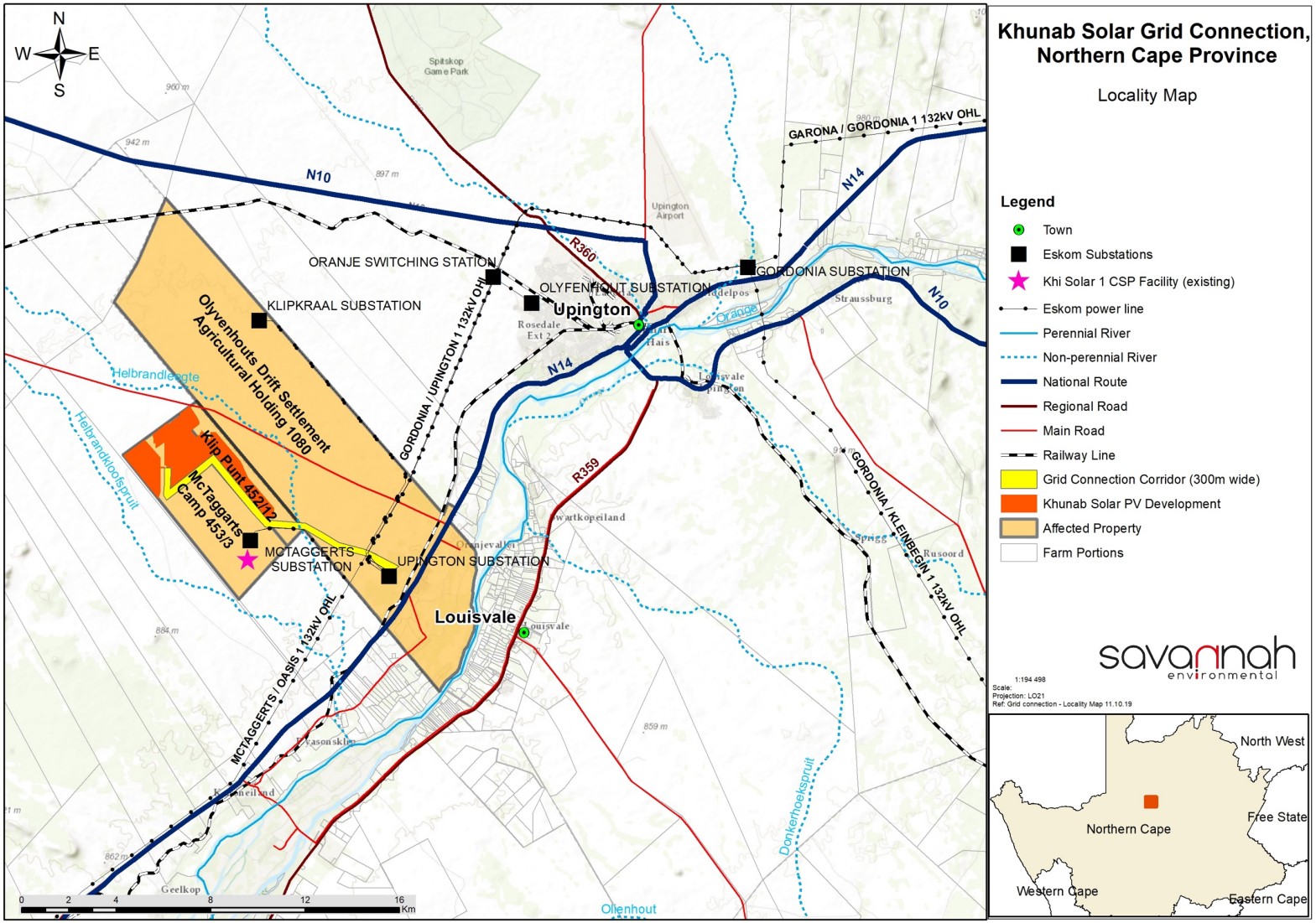

Figure 1.1: A locality map illustrating the grid connection corridor under investigation for the establishment of the Khunab Solar Grid Connection

Table 1.1: A detailed description of the grid connection corridor for the development of the Khunab Solar Grid Connection.

Province	Northern Cape Province
District Municipality	ZF Mgcawu District Municipality
Local Municipality	Kai !Garib Municipality and Dawid Kruiper District Municipality
Ward number(s)	Ward 8 of Kai !Garib Municipality and Ward 11 of Dawid Kruiper municipality
Nearest town(s)	Upington (18km) and Keimoes (50km)
Affected Properties: Farm name(s), number(s) and portion numbers	**Grid Connection Corridor (300m wide and 13km long):** » Portion 3 of McTaggarts Camp 453; » Portion 12 of Klip Punt 452; and » Olyvenhouts Drift Settlement Agricultural Holding 1080
SG 21 Digit Code (s)	**Grid Connection Corridor (300m wide and 13km long):** » Portion 3 of McTaggarts Camp 453: C02800000000045300003 » Portion 12 of Klip Punt 452: C02800000000045200012 » Olyvenhouts Drift Settlement Agricultural Holding 1080: C02800130000108000000
Current zoning and land use	Agricultural and special use (energy generation)

1.4 Objectives of the Basic Assessment Process

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

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

The potential environmental impacts associated with the construction, operation and decommissioning phases of infrastructure associated with the Khunab Solar Grid Connection are explored in detail in this BA Report. Site specific environmental issues and constraints within the assessed corridor are considered within independent specialist studies in order to test the environmental suitability of the corridor for the

development of the proposed grid connection solution. The additional objective of the specialist studies is to also delineate areas of sensitivity within the corridor, and ultimately inform the placement of the substations, power line and associated infrastructure with the assessed corridor.

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

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

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), McTaggarts PV1 (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd (Savannah Environmental) as the independent Environmental Assessment consultant to undertake the Basic Assessment and prepare the BA Report for the proposed Khunab Solar Grid Connection. Neither Savannah Environmental nor any of its specialists are subsidiaries of, or are affiliated to McTaggarts PV1 (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing a holistic environmental management service, including environmental assessment and planning to ensure compliance and evaluate the risk of development, and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

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

- ***Kritanya Naidoo***, the principle author of this report. She holds a Bachelor's degree with Honours in Environmental Management and has 4 years of experience. Her key focus is on environmental management plans and programmes, environmental compliance audits and environmental impact assessments.
- ***Lisa Opperman*** is the co-author of this report. She holds a Bachelor's degree with Honours in Environmental Management and has four years of experience in the environmental field. Her key focus is on environmental impact assessments, public participation, environmental management plans and programmes, as well as mapping using ArcGIS for a variety of environmental projects.
- ***Nicolene Venter*** is responsible for the public participation process for the BA. She is a Board Member of IAPSA (International Association for Public Participation South Africa). She has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.
- ***Jo-Anne Thomas*** is the registered EAP for this project. Jo-Anne holds a Master of Science Degree from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has over 20 years of

experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. During this time, she has managed and coordinated a multitude of large-scale infrastructure EIAs and is also well versed in the management and leadership of teams of specialist consultants, and dynamic stakeholders. Jo-Anne has been responsible for providing technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, EIA studies, environmental permitting, public participation, EMPs and EMPrs, environmental policy, strategy and guideline formulation, and integrated environmental management (IEM). Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation.

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

Company	Specialist Area of Expertise	Specialist Name
3Foxes Biodiversity Consulting	Ecology	Simon Todd
3Foxes Biodiversity Consulting	Avifauna	Eric Hermann
EnviroSci (Pty) Ltd	Freshwater (Specialist Input Letter)	Brian Colloty
TerraAfrica	Soils and Agricultural Potential	Marinè Pienaar
Environmental Planning and Design	Visual Impact Assessment	Jon Marshall
CTS Heritage	Heritage (including archaeology and palaeobtology)	Jenna Lavin
Savannah Environmental and Neville Bews and Associates	Social environment	Lisa Opperman and Neville Bews

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

1.6 Screening Tool Specialist Assessments

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of BA applications in terms of Regulation 19 and 21 of the 2014 EIA Regulations.

Two screening reports were conducted, one for the 132kV single-circuit power line and the other for the two collector substations, both of which fall within the grid corridor. The requirement for the submission of a Screening Report (**Appendix L1** and **L2**) for the proposed development is applicable as it triggers Regulation 19 of the 2014 EIA Regulations (as amended); therefore, **Table 1.2** provides a summary of the specialists assessments identified in the Screening Report and responses to each assessment in terms of the project proposed.

Table 1.2: Specialist assessments identified in terms of the national web based environmental screening tool for the power line and collector substations.

Specialist Assessment	Project Team Response
Agricultural Impact Assessment	A Soil, Land Use, Land Capability and Agricultural Assessment has been undertaken for the Khunab Solar Grid Connection and is included in this BA Report as **Appendix G**.
Landscape/Visual Impact Assessment	A Visual Impact Assessment has been undertaken for the Khunab Solar Grid Connection and is included in this BA Report as **Appendix I.**
Archaeological and Cultural Heritage Impact Assessment	This BA Report includes a Heritage Impact Assessment (including archaeology and palaeonotology) which is included in this BA Report as **Appendix H.**
Palaeontology Impact Assessment	The Heritage Impact Assessment (**Appendix H**) includes an assessment of Khunab Solar Grid Connection on palaeontological resources within the grid connection corridor.
Terrestrial Biodiversity Impact Assessment	An Ecological Impact Assessment (included as **Appendix D**) assesses the impact of Khunab Solar Grid Connection on the biophysical (i.e. flora and fauna) environment identified within the grid connection corridor of the project.
Aquatic Biodiversity Impact Assessment	Aquatic biodiversity present within the grid connection corridor for the Khunab Solar Grid Connection has been included in the Ecological Impact Assessment (**Appendix D**). A specialist input letter has also been provided by a Surface Water Specialist which provides comment on the surface water features located within the grid connection corridor (**Appendix F**).
Avian Impact Assessment	The Avifaunal Impact Assessment includes an assessment of the grid connection corridor including the infrastructure and is enclosed in this BA Report as **Appendix E.**
Civil Aviation Assessment	No assessment is required. The South African Civil Aviation Authority (CAA) will be consulted in order to obtain comments from a civil aviation perspective. The applicant will also obtain the necessary CAA approvals for the grid connection infrastructure once the final position of the power line route and two collector substations within the grid connection corridor is confirmed and final.
Geotechnical Assessment	A Geotechnical Assessment for the Khunab Solar Grid Connection can only be undertaken once the final power line route (including pylon positions and foundations) and final collector substation locations are confirmed. Due to the lack of a final development footprint at this planning stage (i.e. Basic Assessment Process), this study is not possible and will be conducted once the required information is available, prior to the commencement of the construction phase.
Plant Species Assessment	The Ecological Impact Assessment (**Appendix D**) has assessed the impacts of the proposed development on plant and animal species identified within the grid connection corridor.
Animal Species Assessment	

CHAPTER 2: PROJECT DESCRIPTION

This chapter provides an overview of the Khunab Solar Grid Connection and details of the project scope, which includes the planning/design, construction, operation and decommissioning activities required for the development.

1.7 2.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

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

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

Requirement	Relevant Section
3(b) the location of the activity including (I) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (I) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the proposed Khunab Solar Grid Connection is detailed in Chapter 1, **Table 1.1**, as well as section 2.2.1 below.
3(c)(I)(ii) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A layout map illustrating the grid connection corridor (300m wide and 13km long) within which the grid connection infrastructure is planned to be developed for the Khunab Solar Development is included as **Figure 2.2**.
3(d)(ii) a description of the scope of the proposed activity, including a description of the activities to be undertaken including associated structures and infrastructure	A description of the activities to be undertaken with the development of the Khunab Solar Grid Connection is included in **Table 2.1** and **Table 2.2**.

2.2 Nature and extent of the Khunab Solar Grid Connection

McTaggarts PV1 (Pty) Ltd proposes the construction and operation of a grid connection solution for the proposed McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and Klip Punt PV1 solar PV facilities, collectively known as the Khunab Solar Development, near Upington in the Northern Cape. The grid connection infrastructure is required in order to enable the evacuation of the generated power from the Khunab Solar Development to the national grid. The grid connection infrastructure includes two collector substations, each with a switching station component, located within the grid connection corridor. The collector substations are known as the Khunab Collector Substation and the Klip Punt Collector Substation. Each of the collector substations cater for two solar PV facilities through collecting the generated solar power from both facilities to the one collector substation. The Khunab Collector Substation will accommodate the generated power from the McTaggarts PV2 and McTaggarts PV3 solar PV facilities. The Klip Punt Collector

Substation will accommodate the generated power from the Klip Punt PV1 and McTaggarts PV1 solar PV facilities. The switching station components included as part of each of the collector substations step up the generated solar power from a low voltage to 132kV. The stepped-up power is then planned to be evacuated to the national grid via a 132kV single-circuit power line to the existing Upington Main Transmission Station (MTS). This is the grid connection solution for the four planned solar PV facilities.

The grid connection infrastructure will be located within a grid connection corridor[6]. The corridor is 13km in length and is located to the east of the existing Khi Solar One facility (CSP tower facility) and its associated McTaggerts Substation. A small section of the grid connection corridor is aligned parallel to the existing McTaggerts 132kV power line, which evacuates the power from the Khi Solar One facility. The 132kV power line towers will be up to 32m in height, and the servitude width for the power line will be up to 36m wide. The extent of each collector substation footprint, including the switching station component, will be approximately 1.15 hectares and the capacity of each substation will be 132kV.

2.2.1. Project Site (ie Grid Connection Corridor)

The grid connection corridor is located within the Kai !Garib and Dawid Kruiper Local Municipalities of the greater ZF Mgcawu District Municipality in the Northern Province. The following properties[7] are traversed by the grid connection corridor:

- Portion 3 of McTaggarts Camp 453;
- Portion 12 of Klip Punt 452; and
- Olyvenhouts Drift Settlement Agricultural Holding 1080

Access to the grid connection corridor is possible via the Lutzputz existing gravel road in close vicinity to the corridor. Apart from this existing gravel road there will be two proposed access roads (access road 1 and access road 2) that will connect to each collector substation. Formal roads will not be constructed underneath the power line for maintenance purposes; access for maintenance purposes will be limited to jeep tracks.

The Khi Solar One facility (CSP), Sirus Solar One (PV) and Dyason's Klip 1 and 2 (PV) power lines, which are all linked to the Upington MTS, are all located to the south of the proposed grid connection corridor and located within the Northern Corridor of the Strategic Transmission Corridors.

The Northern Corridor is one of five corridors identified for the rollout of large-scale electricity transmission and distribution infrastructure. The grid connection corridor is also located within Zone 7 of the Renewable Energy Development Zones (REDZ), otherwise known as the Upington REDZ, which has been earmarked for the development of large scale solar photovoltaic energy facilities (**Figure 2.1**).

[6] The grid connection corridor is 300m wide and both the proposed collector substations and the 132kV single-circuit power line will be located within the assessed corridor.

7 The grid connection corridor traverses limited sections of 3 affected properties.

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

The grid connection corridor is proposed to accommodate the following infrastructure:

» two (2) collector substations known as the Khunab Collector Substation and the Klip Punt Collector Substation;
» a single circuit 132kV overhead power line between the collector substations and the Upington MTS; and
» associated infrastructure such as access roads, feeder bays, a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.
»

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

Table 2.1: Confirmed details or dimensions of the proposed Khunab Solar Grid Connection project[8]

Infrastructure	Footprint, dimensions and details
Corridor width (for assessment purposes)	A 300m wide grid connection corridor is being assessed within which the grid connection infrastructure will be constructed and operated. The corridor increases to ~700m at the Upington MTS.
Corridor coordinates	Start: 28°30'27.89"S 21° 2'30.29"E Middle: 28°30'15.02"S 21° 3'41.17"E End: 28°32'49.99"S. 21° 8'22.96"E
Power line	Single-circuit power line
Power line capacity	132kV
Power line servitude width	Up to 36m
Length of the power line	Up to 13km
Height of the towers	Up to 32m
Collector substations	1. The Khunab Collector Substation, located on Portion 3 of McTaggarts Camp 453, will cater for the proposed McTaggarts PV2 and McTaggarts PV3 solar PV facilities. 2. The Klip Punt Collector Substation, located on Portion 3 of McTaggarts Camp 453 and Portion 12 of Klip Punt 452, will cater for the proposed Klip Punt PV1 and McTaggarts PV1 solar PV facilities.
Collector substations' capacity	132kV
Collector substations' development footprint	up to 1.5 each
Access roads/ tracks	Two proposed main access roads providing direct access to the two collector substations, each with a width of up to 4m wide.

[8] The confirmed details and dimensions of the Khunab Solar Grid Connection was assessed as part of the independent specialist studies.

	Access to the power line for maintenance purposes will be limited to jeep tracks or gravel roads.

Figure 2.2 illustrates the grid connection corridor proposed for the development of the Khunab Solar Grid Connection.

Table 2.2 provides the details regarding the requirements and the activities to be undertaken during the Khunab Solar Grid Connection development phases (i.e. construction phase, operation phase and decommissioning phase).

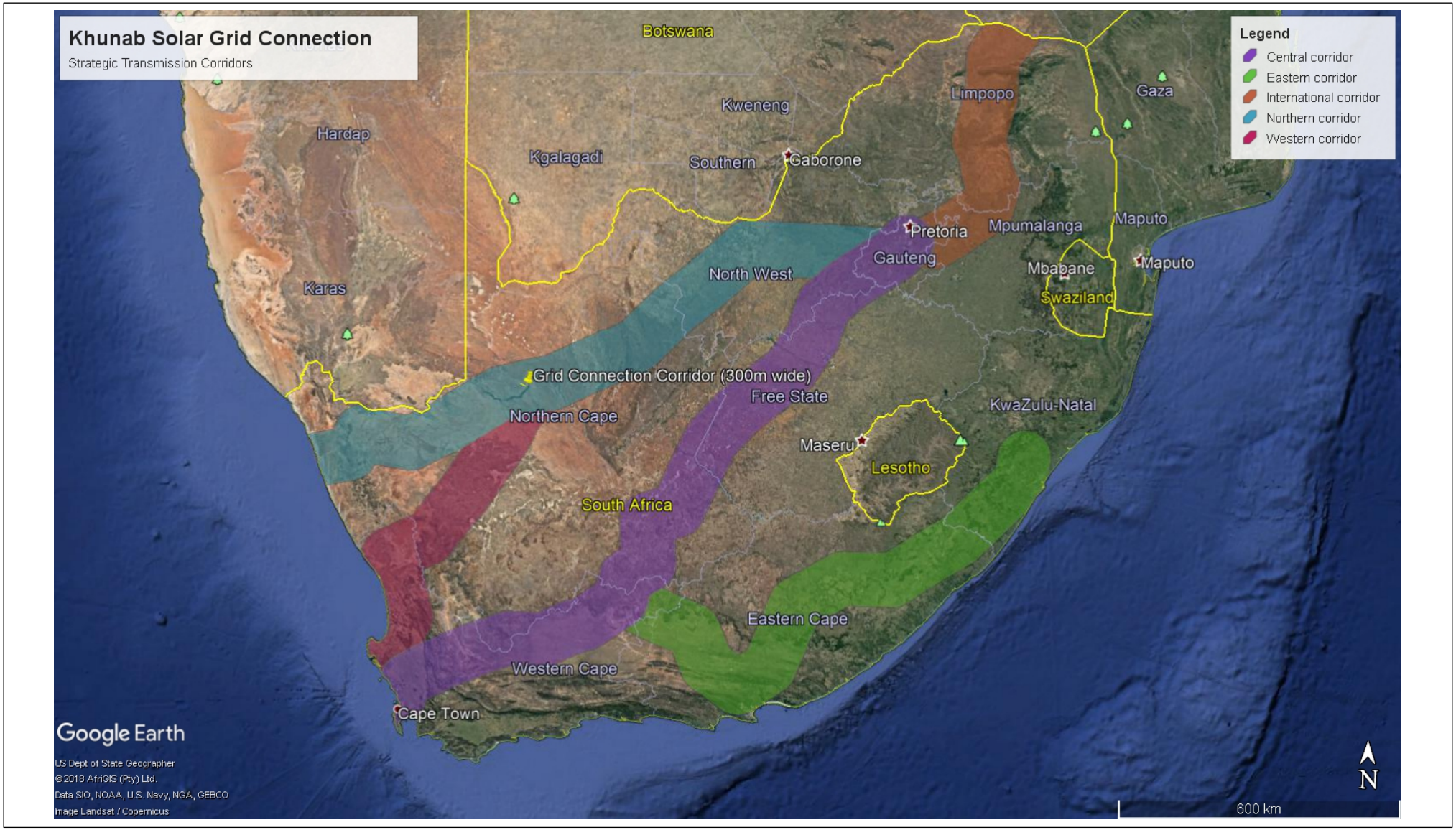

Figure 2.1: The location of the Khunab Solar Development grid connection corridor within the Northern Corridor of the Strategic Transmission Corridors

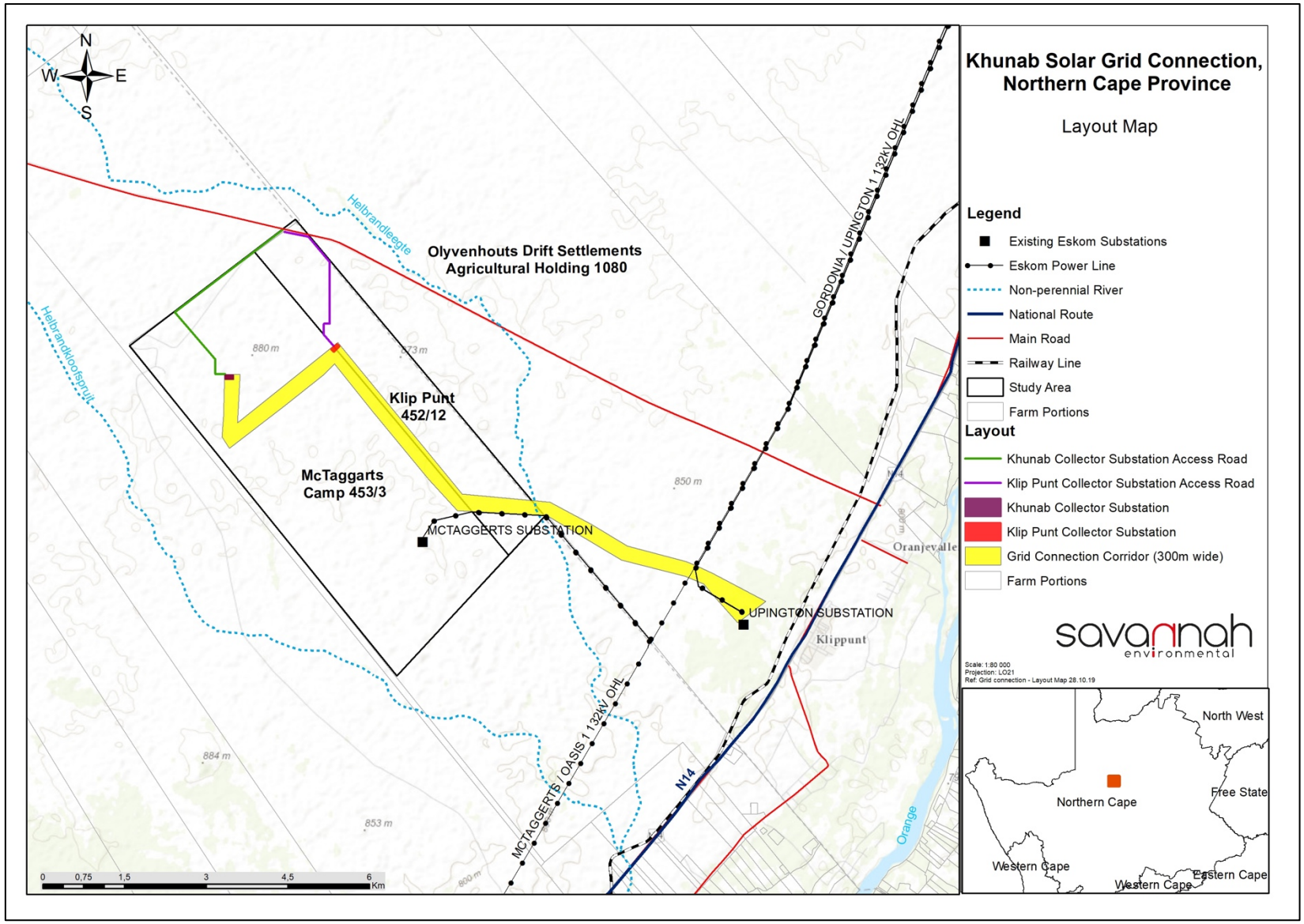

Figure 2.2: Grid connection corridor associated with the Khunab Solar Grid Connection. The grid connection infrastructure (collector substations and 132kV power line) will be constructed and operated within the 300m wide corridor.

2.2.3 Project Development Phases associated with the grid connection infrastructure for Khunab Solar Grid Connection

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

Construction Phase	
Requirements	» Duration of the construction phase is expected to be up to 12 months. » Create direct construction employment opportunities. Up to 110 employment opportunities will be created during the construction phase. » No on-site labour camps are required. Employees to be accommodated in the nearby towns such as Upington and Keimoes, and transported to and from site on a daily basis. » Overnight on-site worker presence would be limited to security staff. » Construction waste will be stored on site and waste removal and sanitation will be undertaken by a sub-contractor or the municipality. » Electricity required for construction activities will be generated by a generator or will be sourced from available 11kV or 22kV Eskom distribution networks in the area. » Negligible water will be required for the construction phase and potable needs. Where required, water will be sourced from the Local Municipality, or private service providers.
Construction sequence	Overhead power lines are constructed in the following simplified sequence: » Step 1: Surveying of the development area and negotiating with affected landowners; » Step 2: Final design and micro-siting of the infrastructure based on geo-technical, topographical conditions and potential environmental sensitivities; » Step 3: Vegetation clearance and construction of access roads/tracks (where required); » Step 4: Construction of tower/pylon foundations; » Step 5: Assembly and erection of infrastructure on site; » Step 6: Stringing of conductors; » Step 7: Rehabilitation of disturbed areas; » Step 8: Continued maintenance. It is anticipated that the construction of the single-circuit 132kV power line and associated infrastructure will take up to 12 months to complete. The construction period will however depend on the season and the climatic conditions on site. The final definition of the centre line for the power line and co-ordinates of each bend in the line (if applicable) will be determined on receipt of an environmental authorisation of the assessed corridor by the competent authority and after negotiations with landowners and final environmental and technical surveys. Collector substations are constructed in the following simplified sequence: » Step1: Conduct geotechnical investigations to determine founding conditions; » Step 2: Conduct site survey; » Step 3: Vegetation clearance and construction of access road;

	» Step 4: Site grading and levelling; » Step 5: Construction of foundations; » Step 6: Import of collector substation components; » Step 7: Construction of collector substation; » Step 8: Rehabilitation of disturbed area and protection of erosion sensitive areas; and » Step 9: Testing and commissioning. The footprints of the collector substations may include administrative buildings required for the operation and management of the substations.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to a geotechnical survey, site survey (including the location of the collector substations within the grid connection corridor) and confirmation of the power line servitude, and all other associated infrastructure.
Establishment of access roads	» Access roads/tracks to be established within the grid connection corridor (underneath the final confirmed power line route) for construction and/or maintenance activities required. » Access roads/tracks will be established as construction commences at the various locations within the corridor. » Existing access roads will be utilised where possible to minimise impact and upgraded where required. » Access roads/ tracks will be limited to gravel roads or jeep tracks.
Undertake site preparation	» Including the clearance of vegetation along the final power line route, the establishment of access roads/tracks and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread on site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected to erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required) along the final power line route and within the two collector substation footprints.
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.
Operation Phase	
Requirements	» Duration will be 20 years, or longer as needed for the operation of the Khunab Solar Development. » Requirements for security and maintenance of the grid connection infrastructure.

	» Employment opportunities relating mainly to operation activities and maintenance. Very limited employment opportunities will be available[9]. » Current land-use activities, i.e. grazing, can continue in the areas adjacent to the infrastructure.
Activities to be undertaken	
Operation and Maintenance	» Part-time security and maintenance staff, especially for the collector substation. » Disposal of waste products (e.g. oil) in accordance with relevant waste management legislation. » On-going rehabilitation of those areas which were disturbed during the construction phase. » During the operation phase vegetation within the power line servitude (up to 36m), and around the collector substations will require management only if it impacts on the safety and operational objectives of the project. » The maintenance of the grid connection infrastructure will be the responsibility of the holder of the Environmental Authorisation.
Decommissioning Phase	
Requirements	» Decommissioning of the Khunab Solar Grid Connection at the end of its economic life. » Expected lifespan of approximately 20 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	» Confirming the integrity of access to the grid connection infrastructure to accommodate the required equipment. » Mobilisation of decommissioning equipment.
Disassemble components and rehabilitation	» The grid connection infrastructure components will be disassembled and reused and recycled (where possible). » Where components cannot be reused or recycled they will be disposed of in accordance with the regulatory requirements at the time of decommissioning. » Disturbed areas, where infrastructure has been removed, will be rehabilitated, if required and depending on the future land-use of the affected areas and the relevant legislation applicable at the time of decommissioning.

[9] It must be noted that the McTaggarts PV1 (Pty) will construct the 132kV single-circuit power line, however ownership of the line will be transferred to Eskom following the completion of the construction. The operation and maintenance of the line will then be undertaken by Eskom.

It is expected that the areas affected by the grid connection infrastructure will revert back to the original land-use (i.e. primarily sheep farming and grazing) once the Khunab Solar Development (and by implication the proposed Khunab Solar Grid Connection) has reached the end of its economic life and all infrastructure has been decommissioned.

CHAPTER 3: ALTERNATIVES

This chapter details the preferred location, grid connection, activity and technology alternatives as well as the 'do nothing' option for Khunab Solar Grid Connection.

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

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

Requirement	Relevant Section
3(g) a motivation for the preferred site, activity and technology alternative	The motivation for the preferred site (i.e. grid connection corridor) associated with the development of the Khunab Solar Grid Connection is included in section 3.2. It must be noted that no activity or technology alternatives are associated with the development of the Khunab Solar Grid Connection due to the specific infrastructure requirements to connect the Khunab Solar Development to the national grid. Therefore, no activity and technology alternatives are considered for the project.
3(h)(i) details of the alternative considered	The details of all alternatives considered as part of the Khunab Solar Grid Connection are included in section 3.3.
3(h)(ix) the outcome of the site selection matrix	The site selection process followed by the developer in order to identify the grid connection corridor, within which the grid connection infrastructure will be developed, is described in section 3.2.
3(h)(x) if no alternatives, including alternative locations for the activity were investigation, the motivation for not considering such	Where no alternatives have been considered, motivation has been included in section 3.3.

3.2 Site Selection process

The selection of the grid connection corridor was based on the consideration of potential sensitive environmental features located within the corridor. Prior to the undertaking of the BA process for the project, the developer considered and identified potentially sensitive areas in the corridor and within the directly surrounding area in order to identify the most suitable corridor from an environmental perspective for the development of the grid connection infrastructure. A watercourse and tributaries were identified within the general area, which would be required to be traversed in order to connect the Khunab Solar Development to the Upington MTS. The route of the grid connection corridor was identified and selected to ensure that the corridor transverses the watercourse at the narrowest point and avoids several tributaries located to the south of the planned corridor. Through preliminary environmental studies and specialist input undertaken during the planning stages (prior to the BA process), it was confirmed by the development team that the grid connection corridor can be located on the 3 affected properties based on the initial specialist inputs received.

The grid connection corridor traverses three affected properties, namely:

» Portion 3 of McTaggarts Camp 453;

» Portion 12 of Klip Punt 452; and
» Olyvenhouts Drift Settlement Agricultural Holding 1080
»

The BA Report and independent specialists, however, considered and assessed the grid connection corridor in its entirety, to advise on the suitability of the corridor.

1.8 3.3Project Alternatives under Consideration for the Khunab Solar Grid Connection

Fundamentally different alternatives are usually assessed at a strategic level and, as a result, project specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the DoE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP)[10], and will continue to be addressed as part of future revisions thereto. In this regard, the need for renewable energy power generation from solar energy has been identified as part of the technology mix for power generation in the country in the next 20 years.

The following alternatives have been considered as part of the BA Report for the Khunab Solar Grid Connection.

3.3.1 Location (site-specific) Alternatives

The preferred grid connection corridor proposed for the grid connection solution was identified by the McTaggarts PV1 (Pty) Ltd project team and informed by consideration of specific topographical features located within the area; and an environmental screening undertaken in the planning phase of the project, prior to the commencement of the BA process. The identification of the corridor was also based on the location of the available grid connection point into the national grid (i.e. the Upington MTS) in relation to the locations of the planned McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and Klip Punt PV1 solar PV facilities.

The developer considered that some limitations and challenges may be expected should specific topographical features not be favourable for the development of the grid connection solution. The specific topographical features considered, and the results thereof, are discussed in the sections below.

» ***Land Availability and Land Use*** – In order to develop the Khunab Solar Grid Connection, sufficient space and access to land is required. The grid connection corridor identified for the Khunab Solar Grid Connection is not suitable for rainfed crop production and according to the metadata released by DAFF in 2017, the area has a very low to low land capability and is more suited for livestock grazing (Pienaar, 2019). Therefore, the land use within the corridor is mainly for grazing and energy generation (as the site is located within the Upington REDZ and adjacent to the operational Khi Solar One facility). The larger region is known for its high-quality horticultural products, which are produced where irrigation water and

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

infrastructure is present along the Orange River. No irrigation infrastructure or alternative irrigation water supply is present within the grid connection corridor.

»

The study area has a low environmental sensitivity to the proposed development. The shallow soil profiles (as discussed in detail in the Soil, Land Use, Land Capability and Agricultural specialist report, refer to **Appendix G**) have a limited grazing capacity and the proposed development of the Khunab Solar Grid Connection will have little or no negative impact of the agricultural economy of the region.

Considering the tracts of land currently available for use, and which are not intensely used for agricultural purposes, sufficient land is available for the development of the Khunab Solar Grid Connection.

» ***Access to the National Grid*** – the proposed power line will route from the two collector substations to the existing Upington MTS for evacuation of the generated electricity into the national grid. The Upington MTS is located ~15km to the south-west of the starting point of the grid connection corridor at the Khunab Collector Substation. The developer, through consultation with Eskom and by review of The Transmission Development Plan (TDP, 2018) for SA, has confirmed the availability of capacity to connect the Khunab Solar Development to the Upington MTS.

» ***Geographical and topographical considerations*** – the topography of the larger area is homogenous and is described predominantly as lowlands with hills and dunes to the north of the study area and small hills can be seen towards the west and south-west of the grid connection corridor (Marshall, 2019).

The region surrounding the grid connection corridor is relatively flat, with minor ridgelines that were formed by a historic dunefield that runs in a general northwest and southwest direction at regular intervals. The terrain surrounding the grid connection corridor is predominantly flat with an even south-eastern slope towards the Orange River Valley that forms a distinct hydrological feature in the region. The grid connection corridor is located within this area of relatively flat topography between 1.2km and 10.2km to the northwest of the Orange River Valley. There are two minor non-perennial watercourses, the Helbrandkloofspruit and the Helbrandleegte, that run close to the grid connection corridor before they flow into the Orange River Valley. The Helbrandleegte is traversed by the corridor at its approximate halfway point.

The developer has confirmed that it will be possible for the power line to span the Helbrandleegte watercourse.

» ***Consideration of sensitive environmental features*** – Through the assessment of a much larger corridor within which the grid connection infrastructure can be placed, an opportunity has been created by the applicant for the avoidance of sensitive environmental features and areas. The consideration of the grid connection corridor, which is approximately 10 times the width of the required power line servitude, enables the avoidance of the environmental sensitivities, thereby ensuring that the grid connection infrastructure can be appropriately placed without resulting in an unacceptable environmental impact. This consideration is in line with the mitigation strategy and enables the achievement of the objectives of the mitigation hierarchy (i.e. avoid, minimise, mitigate). This application of the mitigation strategy will result in the identification of the optimised placement of the grid connection infrastructure within the grid connection corridor.

Therefore, considering the above characteristics associated with the grid connection corridor, no location alternatives for the placement of the grid connection infrastructure have been identified. Only the already indicated 300m wide grid connection corridor will be assessed as part of this BA Report.

3.3.2 Grid Connection Alternatives

Two grid connection corridor alternatives were initially identified by the developer. These alternatives both connect the Khunab Solar Development to the Upington MTS. Refer to **Figure 3.1.**

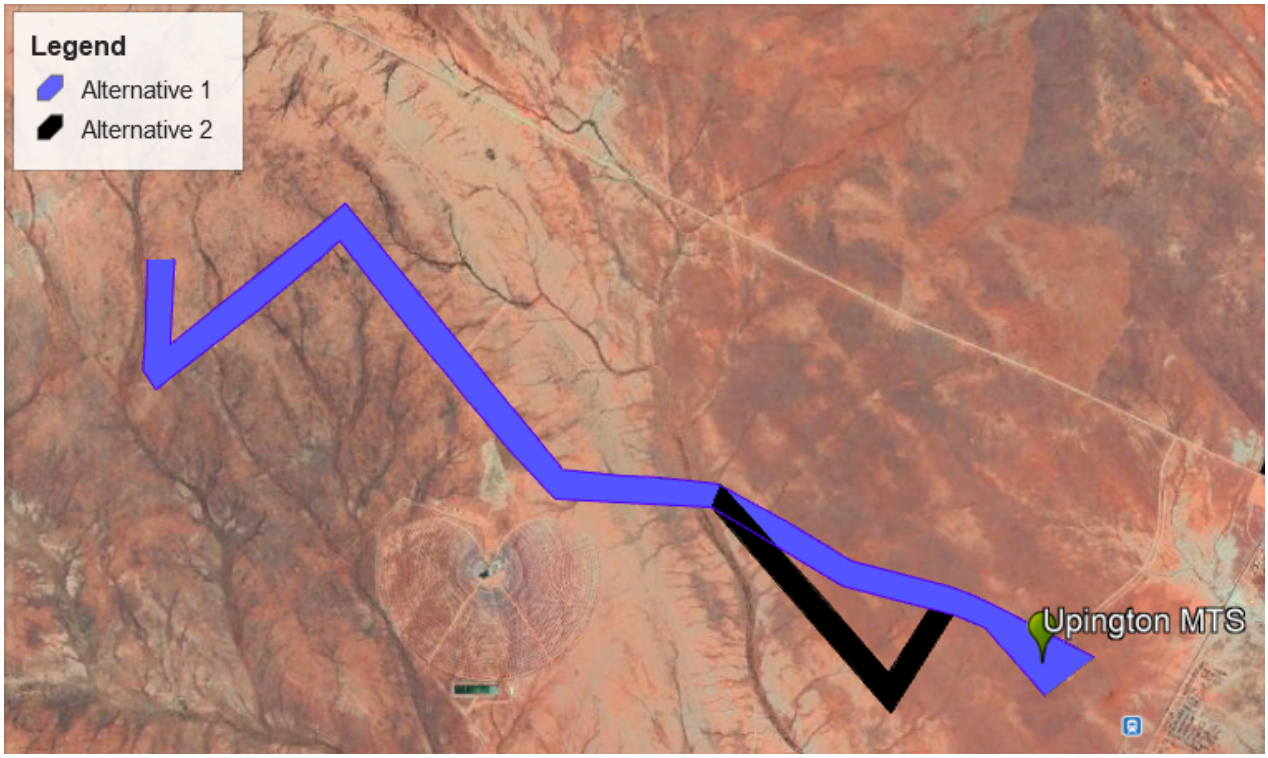

Figure 3.1: Grid connection corridor alternatives initially considered for the Khunab Solar Grid Connection

Following the consideration of the technical characteristics of each alternative and the infrastructure requirements associated with each alternative the developer discarded Alternative 2 as a technically viable and feasible option for development. The discarding of Alternative 2 is based on the technical challenges in terms of the right angles which are not feasible for power line construction, and the increased length of the power line route, which results in more infrastructure than Alternative 1.

Alternative 1 was therefore identified by the developer as the preferred alternative from a technical feasibility perspective and has been fully considered and assessed as part of this BA process and within this BA Report.

Considering the above, no grid connection corridor alternatives are proposed or assessed as part of this BA process.

3.3.3 Collector Substation Location Alternatives

Two collector substations, each including a switching station component, are required to be developed as part of the grid connection infrastructure in order to cater for the grid connection solution for the four solar PV facilities.

As the function of each of the collector substations is to collect the generated power from two solar PV facilities, the locations of the collector substations within the grid connection corridor is dependent on the locations of the facility on-site substations[11] (assessed as part of the four separate BA processes for the PV facilities). Considering the dependency of the collector substation locations on the solar PV facility on-site substations' locations, no collector substation location alternatives are being assessed and considered as part of this BA process.

3.3.4 The 'do-nothing' Alternative

The 'do-nothing' alternative is the option of McTaggarts PV1 (Pty) Ltd not constructing the grid connection infrastructure within the grid connection corridor. This would result in no environment or social impacts (positive or negative) as a result of the development of the single-circuit 132kV power line and two collector substations within the corridor. This alternative is assessed in detail within Chapter 8 and Chapter 10 of this final BA Report.

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

The option of not developing the Khunab Solar Grid Connection required for the Khunab Solar Development is not preferred.

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

CHAPTER 4: REGULATORY AND PLANNING CONTEXT

This chapter provides insight into the policy and legislative context within which the development of the proposed Khunab Solar Grid Connection will be undertaken. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process which may be applicable to or have bearing on the proposed project.

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

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

Requirement	Relevant Section
3(e)(i) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report	Chapter 4 as a whole provides an overview of the policy and legislative context which is considered to be associated and relevant to the development of the Khunab Solar Grid Connection. The regulatory and planning context has been considered at international, national, provincial and local level.
3(e)(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools, frameworks and instruments.	**Tables 4.1, 4.2, 4.3** and **4.4** illustrate the compliance of the proposed Khunab Solar Grid Connection with the legislation, policies, plans, guidelines, tools, frameworks and instruments.

4.2. Strategic Electricity Planning in South Africa

The regulatory hierarchy of policy and planning documentation that supports the development of a project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the proposed development of the Khunab Solar Grid Connection.

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

» **Department of Environmental Affairs (DEA)[12]:** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the 2014 EIA Regulations (GN R326) as amended. DEA

[12] The Department of Environmental Affairs (DEA) is soon to become the Department of Environment, Forestry and Fisheries (DEFF).

is the competent authority for this project (as per GNR 779 of 01 July 2016), and is charged with granting the EA for the project under consideration based on its association with the proposed Khunab Solar Development.

- ***South African Heritage Resources Agency (SAHRA):*** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- ***Department of Water and Sanitation[13]:*** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation).
- ***Department of Energy (DoE):*** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity.
- ***Department of Mineral Resources (DMR):*** This Department is responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (No. 28 of 2002) (MPRDA) in terms of Section 53 of the MPRDA. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resource that may occur within the broader study area and development area.
- ***The Department of Agriculture, Forestry and Fisheries (DAFF)[14]:*** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).
- ***South African National Roads Agency Limited (SANRAL):*** SANRAL is responsible for the regulation and maintenance of all national roads and routes.
- ***National Energy Regulator of South Africa (NERSA):*** This body is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.

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

- ***Northern Cape Department of Environment, and Nature Conservation (DENC):*** DENC is the Commenting Authority for the project and is also responsible for issuing any biodiversity and conservation-related permits. DENC's involvement relates specifically to sustainable resource management, conservation of protected species and land care.
- ***Northern Cape Department of Roads and Public Works (NCDRPW)****:* NCDRPW is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- ***Ngwao Boswa Kapa Bokone (NBKB):*** NBKB, the Northern Cape Provincial Heritage Resources Authority is responsible for the identification, conservation and management of heritage resources, as well as commenting on heritage related issues within the Province.

[13] The Department of Water and Sanitation (DWS) is soon to become the Department of Human Settlements, Water and Sanitation.

[14] The Department of Agriculture, Forestry and Fisheries is soon to become the Department of Agriculture, Rural Development and Land Reform

» ***Northern Cape Department of Transport, Safety and Liaison:*** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.

At the **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape, both the local and district municipalities play a role. The local municipalities traversed by the grid line corridor include both the Kai !Garib and Dawid Kruiper Local Municipalities, which forms part of the ZF Mgcawu District Municipality. In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their governance.

The relevant legislation and policies listed and discussed below are relevant to the Khunab Solar Grid Connection project and the Khunab Solar Development which comprises four individual solar PV facilities (assessed as part of separate Basic Assessment Processes). This is due to the fact that the proposed grid connection infrastructure is directly linked to the operation of the Khunab Solar Development. None of the four solar PV facilities or the grid connection infrastructure can operate on its own and require the other to be developed in order to fulfil the need for the development in its entirety.

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

4.3.1. Policy and Planning on an International Level

South Africa has committed to various international policies which relate to environmental concerns, specifically that of climate change and global warming. **Table 4.1** below provides a summary of the international policies and plans that South Africa has made commitments towards, and how the proposed development of the Khunab Solar Grid Connection aligns with the thinking or commitments of these agreements.

Table 4.1: International policies and plans relevant to the Khunab Solar Grid Connection

Policy or Plan	Is the development of the Khunab Solar Grid Connection aligned with this policy or plan?
The Kyoto Protocol, 1997	Yes. The protocol calls for the reduction of South Africa's greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. The development of Khunab Solar Grid Connection will enable the evacuation of additional capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements as set out in the protocol.
United Nations Framework Convention on Climate Change and COP21 – Paris Agreement	Yes. The Conference of the Parties (COP), established by Article 7 of the UNFCCC, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention. The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. This Agreement is open for signature and subject to ratification, acceptance or approval by States and regional economic integration organisations that are Parties to the Convention from 22 April 2016 to 21 April 2017. Thereafter, this Agreement shall be open for accession from the day following the date on which it is closed for signature. The agreement can only be sanctioned once it has been ratified by 55 countries, representing at least 55% of emissions.

Policy or Plan	Is the development of the Khunab Solar Grid Connection aligned with this policy or plan?
	South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary. Following COP21, countries met in Katowice, Poland from 2 December to 14 December 2018 for COP24. Countries agreed on various elements from COP21 held in Paris in 2015, which pertained to how governments will measure, report and verify their emission-cutting efforts, which was a key element as it ensured all countries are held to proper standards and will find it difficult to renege from the signed agreements. There was, however, a disagreement amongst countries over carbon credits which are awarded to countries for their emission-cutting efforts and their carbon sinks, such as forests, which absorb carbon. The emission count towards countries' emission-cutting targets. Brazil, which hoped to benefit from its large rainforest cover, insisted on a new form of wording which would allow double counting of credits, undermining the integrity of the system. This issue was put on hold and will be discussed at the COP25, to be held in Santiago de Chile, Chile. Largely absent from the COP24 discussions was the question of how countries will step up their targets on cutting emissions. On current targets, the world is set for 3° of warming from pre-industrial levels, which scientists have said would be disastrous, resulting in droughts, floods, sea level rises and the decline of agricultural productivity. However, in 2019, the United Nations will meet again in Chile to discuss the final elements of the COP21 agreement and begin to work on future emission targets[15]. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for the Khunab Solar Grid Connection which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.
The Equator Principles III, June 2013	Yes. The Equator Principles (EPs) III constitute a financial industry benchmark used for determining, assessing, and managing a project's environmental and social risks. The EPs

15 https://www.theguardian.com/environment/2018/dec/16/what-was-agreed-at-cop24-in-poland-and-why-did-it-take-so-long

Policy or Plan	Is the development of the Khunab Solar Grid Connection aligned with this policy or plan?
	are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are applicable to large infrastructure projects and apply globally to all industry sectors. In terms of the EPs, South Africa is a non-designated country, and as such the assessment process for projects located in South Africa evaluates compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability and Environmental Health and Safety (EHS) Guidelines. The Khunab Solar Grid Connection is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended (GNR 326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.
International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability, January 2012	Yes. The overall objectives of the IFC performance standards are to fight poverty, do no harm to people or the environment, fight climate change by promoting low carbon development, respect human rights, promote gender equality, provide information prior to project development, collaborate with the project developer in order to achieve the performance standard, provide advisory services and notify countries of trans boundary impacts. When considering the development of the grid connection infrastructure associated with the development of the Khunab Solar Development the following performance standards are anticipated to be applicable at this stage of the BA process: » *Performance Standard 1:* Assessment and Management of Environmental and Social Risks and Impacts » *Performance Standard 2:* Labour and Working Conditions » *Performance Standard 3:* Resource Efficiency and Pollution Prevention » *Performance Standard 4:* Community Health, Safety and Security » *Performance Standard 6:* Biodiversity Conservation and Sustainable Management of Living Natural Resources » *Performance Standard 8:* Cultural Heritage

4.3.2. Policy and Planning on a National Level

National policies and plans adopted by South Africa, which are considered to be relevant to the development of Khunab Solar Grid Connection have been summarised in **Table 4.2**.

Table 4.2: National policies, plans and legislation relevant to the Khunab Solar Grid Connection

Policy, Plan or Legislation	Is the development of the Khunab Solar Grid Connection aligned with this policy, plan or legislation?
Constitution of the Republic of South Africa, 1996	Yes. Section 24 of the Constitution pertains specifically to the environment. It states that Everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is

Policy, Plan or Legislation	Is the development of the Khunab Solar Grid Connection aligned with this policy, plan or legislation?
	especially significant for previously disadvantaged individuals who are most at risk to environmental impacts.
National Environmental Management Act (No. 107 of 1998) (NEMA)	Yes. South Africa's environmental legislation sets the framework for environmental management in South Africa. NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being as contained within the Bill of Rights. The national environmental management principles states that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed, evaluated, and decisions must be appropriate in the light of such consideration and assessment. The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.
The National Energy Act (2008)	Yes. One of the objectives of the Act is to promote the diversity of the supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources and states that provision must be made for increased generation and consumption of renewable energies. The development of the Khunab Solar Grid Connection enables the evacuation of renewable power into the national grid and thereby promotes diversity of supply of energy and the source of supply, in line with the Act's objectives.
White Paper on the Energy Policy of South Africa, 1998	Yes. The South African Energy Policy of 1998 identifies five key objectives, namely increasing access to affordable energy services, improving energy sector governance, stimulating economic development, managing energy related environmental impacts and securing supply through diversity. In order to meet these objectives South Africa needs to optimally use available energy resources. The development of the Khunab Solar Grid Connection will enable the contribution, albeit only to a limited extent, to the achievement of the five objectives of the Energy Policy of the country.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	Yes. This White Paper fosters the uptake of renewable energy in the economy and has a number of objectives that need to be met, including that equitable resources are invested in renewable technologies. South Africa is also endowed with renewable energy resources that can be sustainable alternatives to fossil fuels. The development of additional renewable energy projects (including Khunab Solar Development) will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix. The development of the grid connection infrastructure enables the evacuation of the generated power into the national grid and thereby enables the use of renewable energy technologies for the country.
The Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended	Yes. The Act establishes a national regulatory framework for the electricity supply industry of the country and introduces the National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated. The developer of the Khunab Solar Development project will have to ensure compliance with this Act for the distribution of the generated power into the national grid.
Renewable Energy Policy in South Africa	Yes. Support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable energy resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. However, the National Energy Policy acknowledges that the development and

Policy, Plan or Legislation	Is the development of the Khunab Solar Grid Connection aligned with this policy, plan or legislation?
	implementation of renewable energy applications has been largely neglected in South Africa. Challenges regarding the implementation of renewable energy have been identified. Through the development of renewable energy projects (including the Khunab Solar Development and the Khunab Solar Grid Connection), additional renewable energy will be made available which will assist with the further growth and development of the renewable energy sector. The development of the grid connection infrastructure enables the evacuation of the generated power into the national grid and thereby enables further growth and development of the renewable energy sector.
National Development Plan (NDP)	Yes. The NDP aims at eliminating poverty and reducing inequality by 2030 and identifies 9 key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy. The plan also sets out steps that aim to ensure that, in 20 years, South Africa's energy system looks very different to the current situation: coal will contribute proportionately less to the primary-energy needs, while gas and renewable energy resources – especially wind, solar and imported hydroelectricity – will play a much larger role. Through the development of renewable energy projects (including the Khunab Solar Development and the associated Khunab Solar Grid Connection) additional renewable energy will be available which will assist in expanding the renewable energy sector of the country and add to the diversification of the energy mix, which is moving away from coal and towards the use of gas and renewable energy.
Integrated Energy Plan (IEP)	Yes. The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. Eight key objectives were identified which relate mainly to the security, cost, access, diversity, efficiency, impact in terms of emissions, conservation and social benefits in terms of energy planning. The IEP recognises the potential of renewable energy for power generation. With the additional renewable energy to be generated by Khunab Solar Development and to be evacuated to the national grid via the proposed grid connection infrastructure, a contribution to this objective will be made. Also, with the development of Khunab Solar Development and the proposed grid connection infrastructure, the eight key objectives in terms of energy planning will be met, even if only to a limited extent.
Integrated Resource Plan (IRP) 2010 - 2030	Yes. The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 constitutes a subset of the IEP and is South Africa's national electricity plan. The document outlines the proposed generation new-build fleet for South Africa. The adopted scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. The IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies. The plan includes 17.8GW of renewables, 9.6GW of nuclear; 6.25GW of coal, and approximately 8.9GW of other generation sources such as hydro, and gas. The development of the proposed grid connection infrastructure enables the evacuation of the generated power from the Khunab Solar Development into the national grid and thereby contributes to the energy mix of the country as set out in the IRP.
Strategic Integrated Projects (SIP)	Yes. In 2010, a National Development Plan was drafted to address socio-economic issues affecting development in South Africa. These issues were identified and placed under 18 different Strategic Integrated Projects (SIPs) to address the spatial imbalances of the past

Policy, Plan or Legislation	Is the development of the Khunab Solar Grid Connection aligned with this policy, plan or legislation?
	by addressing the needs of the poorer provinces and enabling socio-economic development. The development the Khunab Solar Grid Connection will support the Strategic Integrated Projects within one SIP, which relates to the development of the associated infrastructure. This is known as SIP 10 – electricity transmission and distribution for all. In support of SIP 10, the Department of Environmental Affairs undertook a Strategic Environmental Assessment (SEA) which aims to provide guidance for the efficient and sustainable expansion of strategic electricity grid infrastructure in South Africa. This SEA identified the optimal location for strategic corridors where transmission infrastructure expansion is needed to enable the balancing of future demand and supply requirements, while minimising negative impacts to the environment. These areas are referred to as Power Corridors and were gazetted within GNR113 of February 2018. The grid connection corridor proposed for the development of the grid connection infrastructure is located within the Northern Transmission Corridor and is therefore considered to be aligned with national planning in this regard.
New Growth Path (NGP) Framework, 2010	Yes. The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020. With economic growth and employment creation as the key indicators identified in the NGP. To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas. The proposed Khunab Solar Grid Connection will assist with the creation of both temporary and permanent employment opportunities during the construction and operation phases, which will contribute, albeit to a limited extent, to the economy and sustainable growth.
National Climate Change Response Strategy	Yes. This strategy aims to address issues identified as priorities for dealing with climate change in the country. The focus of the strategy is adapting to climate change; developing a sustainable energy programme; adopting an integrated response by the relevant government departments; compiling inventories of greenhouse gases; accessing and managing financial resources; and research, education, and training. The development the Khunab Solar Grid Connection (through the Khunab Solar Development) will enable additional uptake of renewable energy into the national grid which will reduce the need for the use of coal as an energy resource and thereby assist in addressing climate change and global warming.
Climate Change Bill, 2018	Yes, with limited relevance. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The bill aims to provide for the coordinated and integrated response to climate change and its impacts, provide effective management of inevitable climate change impacts and to make a fair contribution to the global effort to stabilise greenhouse gas concentrations. The Khunab Solar Grid Connection relates only to the evacuation of renewable energy into the national grid and would therefore not result in the generation or release of emissions during its operation.

4.3.3. Policy and Planning at a Provincial Level

Policies and plans have been adopted by the Northern Cape Province for the management of the area and are considered to be relevant to the development of the Khunab Solar Grid Connection. **Table 4.3** provides a summary of the relevant provincial plans and policies.

Table 4.3: Provincial policies and plans relevant to the Khunab Solar Grid Connection

Policy or Plan	Is the development of the Khunab Solar Grid Connection aligned with this policy or plan?
Northern Cape Provincial Spatial Development Framework (PSDF), 2012	Yes. The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the province is to enable sustainability through sustainable development. The province considers social and economic development as imperative in order to address the most significant challenge facing the Northern Cape, which is poverty. The PSDF identifies key sectoral strategies and plans which are considered to be the key components of the PSDF. Sectoral Strategy 19 refers to a provincial renewable energy strategy. Within the PSDF a policy has been included which states that renewable energy sources (including the utilisation of solar energy) are to comprise 25% of the province's energy generation capacity by 2020. The overall energy objective for the province also includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the province through appropriate financial and fiscal instruments. With the developed and proposed independent power producer capacity (including the Khunab Solar Development), the Province will produce more than 100% of its own electrical power needs from renewable energy resources (although this energy will be fed into the national grid for national use). The development the Khunab Solar Grid Connection (through the Khunab Solar Development) will enable additional uptake of renewable energy into the national grid which will promote the province's objectives.
The Northern Cape Climate Change Response Strategy	Yes. The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "*The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key. Sectors to ensure proactive long-term responses to the frequency and intensity of extreme weather events such as flooding and wildfire, with heightened requirements for effective disaster management*". Key points from the MEC address include the NCPG's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the NCP's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate

Policy or Plan	Is the development of the Khunab Solar Grid Connection aligned with this policy or plan?
	Change Response Strategy. The MEC further indicated that the NCP was involved in the processing 7 wind energy facility and 11 solar energy facility EIA applications (March 2011)[16]. The development of Khunab Solar Grid Connection will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape through the evacuation of generated solar power from the Khunab Solar Development.

4.3.4. Policy and Planning on a District and Local Level

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

Table 4.4 below provides a summary of the district and local level policies and plans considered to be relevant to the development of the Khunab Solar Grid Connection.

Table 4.4: District and local policies and plans relevant to the Khunab Solar Grid Connection.

Policy or Plan	Is the development of the Khunab Solar Grid Connection aligned with this policy or plan?
ZF Mgcawu District Municipality (DM) Draft Integrated Development Plan (IDP), 2018/2019 (2017-2022)	Yes. The vision of the ZF Mgcawu DM is "Quality support to deliver quality services.". The mission of the ZF Mgcawu DM is "Centre of excellence in providing quality basic services through support to local municipalities." The following strategic and development objectives have been identified for the ZF Mgcawu DM: » To monitor and determine the housing backlogs in the district as well as to eradicate sanitation & infrastructure backlogs » To assess and provide targeted support improving institutional capacity and service delivery capabilities of category B-municipalities » To promote environmental health and safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of environmental health services, fire and disaster risks » To promote safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of fire and disaster risks » To Facilitate the Development of Sustainable regional land use, economic, spatial and environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy » To market, develop and co-ordinate tourism in the ZF Mgcawu District » To assess and monitor the status of infrastructure needs and requirements of B Municipalities » To ensure efficient business operations and to fulfils the assurance statutory requirements of the ZF Mgcawu District Municipality

[16] (www.info.gov.za/speech/DynamicAction?pageid=461&sid=22143&tid=45200).

Policy or Plan	Is the development of the Khunab Solar Grid Connection aligned with this policy or plan?
	The strategic objective of supporting and guiding the development of a diversified, resilient and sustainable district economy, and the development objectives of creating investment opportunities in sectoral development (i.e. investment activities, Entrepreneurial business support programme), and enabling an environment for business establishment and support initiatives (i.e. Increase the number of businesses, entrepreneurial support) through its local content and local economic development requirements as prescribed under the REIPPP Programme will be supported through the proposed development.
Kai !Garib Local Municipality (LM) Integrated Development Plan 2019/2020 (June 2019	Yes. There are six established Independent Power Producers located within the municipality. These projects include Khi Solar One (CSP), which is located on the property directly adjacent to the Khunab Solar Development (which will be catered for by the Khunab Solar Grid Connection), Aries Solar (Solar PV), Neusberg Hydro Electric Project A (Hydro), Dyasons Klip 1(Solar PV), Dyasons Klip 2 (Solar PV) and Sirius Solar PV Project One (Solar PV). The Kai !Garib LM has identified that there is potential for further IPP projects to become operational in the LM, with several already in the planning stages. Kai !Garib LM is also a participant in the ZF Mgcawu Development Forum, an initiative coordinated by the Industrial Development Corporation (IDC) which aims to ensure that integrated development planning and implementation of regional projects take place. This includes the renewable energy and mining plants, together with other industry stakeholders such as agricultural, business and civil society stakeholders. Kai !Garib LM recognises the importance of participating in this forum to provide a platform for partnerships for regional socio-economic growth. The development of Khunab Solar Grid Connection will assist in achieving (although only to a limited extent) the potential for further IPP projects through enabling the evacuation of generated solar power from the Khunab Solar Development.
Dawid Kruiper Local Municipality (LM) Final Reviewed Integrated Development Plan for 2019/2020 (approved on 30 May 2019)	Yes. The LM identified, through the undertaking of a community and stakeholder analysis, key priority issues. Issues relating to energy and electricity have been identified and includes electricity provision to all in need and the upgrading of electricity infrastructure. The LM confirms that it is involved in the national programme for the development of solar power installations in the Upington area. Furthermore, the electricity sector is one of the fastest growing sectors in the municipality and it is considered that the sector must be exploited to ensure the creation of new job opportunities for local people. The development of the Khunab Solar Grid Connection will contribute (although only to a limited extent) to the electricity sector of the LM through enabling the evacuation of generated solar power from the Khunab Solar Development, as well as the development and operation of grid infrastructure within the area.
Dawid Kruiper All-inclusive Spatial Development Framework Final Report (February 2018)	Yes. The IDP (as discussed in the row above) identified the following 8 pillars as being important for development and the Dawid Kruiper Council's envisagement of a self-sustaining ecology with long-term benefit for all inhabitants of Dawid Kruiper: 1. Agriculture 2. Manufacturing and industry 3. Tourism as a sustainable industry 4. Urban development 5. Rural development 6. Social Development 7. Conservation of natural habitats 8. Natural resources

Policy or Plan	Is the development of the Khunab Solar Grid Connection aligned with this policy or plan?
	According to the Dawid Kruiper LM SDF the area under investigation is located within the C.a.2 Agriculture (Ward 11) Spatial Planning Category (SPC). The development of the Khunab Solar Grid Connection is not considered to be in contrast with the Dawid Kruiper LM SDF and the SPC within which the project is located. In addition, the REIPPP Programme requires preferred bidders to make contributions towards local economic development and social upliftment, to be focused on benefitting local communities within the vicinity of the development area.

CHAPTER 5: NEED AND DESIRABILITY

One of the requirements of Appendix 1 of the EIA Regulations, 2014, as amended, is to motivate for "*the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location*". The need and desirability of a development needs to consider whether it is the right time and place for locating the type of land-use / activity within the proposed location.

This Chapter provides an overview of the anticipated suitability of the grid connection infrastructure for the Khunab Solar Grid Connection to be developed within the proposed grid connection corridor and provides an overview of the need and desirability, and perceived benefits of the project.

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

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

Requirement	Relevant Section
3(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location.	The need and desirability of the development of the Khunab Solar Grid Connection is included and discussed as a whole within this chapter.

5.2. Need and Desirability of the Proposed Project

The construction and operation of the Khunab Solar Grid Connection is considered to be essential associated infrastructure for a larger development known as the Khunab Solar Development. The grid connection infrastructure will facilitate the evacuation of the electricity generated by the proposed McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and Klip Punt PV1 into the national grid via the existing Upington MTS. The operation of the four solar PV facilities will not be possible without the development of the proposed Khunab Solar Grid Connection to provide a connection to the national grid. Therefore, considering the relationship between the Khunab Solar Grid Connection and the Khunab Solar Development, the need for the grid connection infrastructure is directly linked to the need and desirability of the four solar PV facilities, which is aligned with national, regional and local policies and plans. This can be summarised as follows:

- The need for the country to respond to the international commitments regarding climate change and reduction in carbon emissions.
- The need at a national level to diversify the power generation technology mix to include up to 17.8GW of renewables, as defined in the Integrated Resource Plan (IRP), 2010 (as discussed in detail in **Chapter 4**).
- The need to align development with the requirements of the National Development Plan in order to address the identified socio-economic issues affecting development in South Africa.
- The need for sustainable development at a Provincial level, including the need to utilise its extensive resources for the benefits of the local area.

- The identification of the need for potential IPP projects to become operational in the local municipality as per the Kai !Garib Local Municipality Integrated Development Plan 2019/2020 (June 2019).
- The local municipality's involvement in the national programme for the development of solar power installations in the Upington area as mentioned in the Dawid Kruiper Local Municipality Final Reviewed Integrated Development Plan for 2019/2020 (approved on 30 May 2019).
- The need to align solar development within those Renewable Energy Development Zones (REDZ areas) identified by Government as the most desirable areas for large-scale PV development.

5.3. Receptiveness and Desirability of the identified grid connection corridor to develop the Khunab Solar Grid Connection

The feasibility of the identified grid connection corridor for the development of the grid connection infrastructure also provides an indication of the desirability of the development within the area. The section below provides a description of the specific considerations that contribute to the desirability of the identified and assessed corridor. These include:

- ***Land Availability and Land Use*** – In order to develop the grid connection infrastructure, sufficient space and access to land from portion 3 of McTaggarts Camp Farm 453 and Olyvenhouts Drift Settlement Agricultural Holding 1080 and portion 12 of Klip Punt Farm 452, is required to establish a connection to the Upington MTS. The grid connection corridor provides sufficient space for the placement of the two collector substations, including the respective switching station components (~2,25ha) and a single-circuit 132kV power line (with a servitude width of up to 36m). A small section of the grid connection corridor is located parallel to the existing McTaggerts-Oasis 132kV power line which caters for the existing Khi Solar One Facility located in the southern section of portion 3 of McTaggarts Camp Farm 453.

- The current land use within the area surrounding the corridor is mainly includes livestock grazing activities, as well as energy generation (including the operational Khi Solar One facility). As far as could be ascertained, the affected properties have not been considered for an alternative land use such as urban development or crop production. Historical tungsten mining activities were undertaken in the northern section of portion 3 of McTaggarts Camp Farm 453, however these historical activities are not located in close proximity to the grid connection corridor and are no longer being undertaken. The development of the Khunab Solar Grid Connection will therefore not contradict or interfere with the current land use activities and it is considered that the current and proposed land uses can be undertaken simultaneously without the one impacting on the other. The development of the Khunab Solar Grid Connection is therefore considered to be desirable from a land use perspective.

- The placement of the grid connection corridor adjacent to the existing McTaggerts-Oasis 132kV power line and the Gordonia- Oranje Switching Station 1 132kV power line also provides an opportunity for the consolidation of linear electrical infrastructure within the area, and the clustering of associated impacts to the environment. This is considered beneficial from an environmental and social perspective and provides an indication of the overall desirability for the development of the Khunab Solar Grid Connection within the grid connection corridor.

- Considering the above, the availability of sufficient space and the current land use activities (i.e. livestock grazing activities) within the grid connection corridor are considered to be suitable for the development of the grid connection infrastructure.

» ***Access to the National Grid*** – The power line will extend from the Khunab Collector Substation to the Klip Punt Collector Substation, and then on to the existing Upington MTS. This grid connection solution will enable the evacuation of the electricity generated by any or all of the four PV facilities planned as part of the Khunab Solar Development to the national grid. The solution eliminates the need for the development of four separate power lines from each of the four PV facilities planned as part of the Khunab Solar Development. This grid connection solution is also considered to be the shortest feasible connection to the national grid and therefore limits the infrastructure requirements and on-ground disturbance. The Upington MTS is considered to have adequate capacity in order to evacuate the generated electricity into the national grid.

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

» ***Geographical and topographical considerations*** – The location of the grid connection infrastructure is considered to be appropriately located as the entire extent of the grid connection corridor is located within the northern corridor of the Strategic Transmission Power Corridors (Figure 5.1) which are identified as areas preferred for the development of grid connection infrastructure.

» The topography of the larger area is homogenous and is described predominantly as lowlands with hills and dunes to the north of the study area and small hills can be seen towards the west and south-west of the proposed grid corridor (Marshall, 2019).

The region surrounding the grid connection corridor is relatively flat, with minor ridgelines that were formed by a historic dune field that runs in a general northwest and southwest direction at regular intervals. There are two minor non-perennial watercourses, the Helbrandkloofspruit and the Helbrandleegte, that run close to the grid connection corridor before they flow into the Orange River Valley. The Helbrandleegte flows across the grid connection corridor at its approximate halfway point. The Helbrandleegte can be spanned by the power line with no direct infringement of the feature expected. Therefore, taking into account the geographical considerations such as the Helbrandleegte River, which the developer has confirmed will be possible to span over, and the relatively flat topography present within the corridor, the grid connection corridor for the development of the Khunab Solar Grid Connection is considered to be desirable.

» ***Consideration of sensitive environmental features*** – Through the assessment of a much larger corridor within which the grid connection infrastructure can be placed, an opportunity has been created by the applicant for the avoidance of sensitive environmental features and areas. The consideration of the grid connection corridor, which is approximately 10 times the width of the required power line servitude, enables the avoidance of the environmental sensitivities, thereby ensuring that the grid connection infrastructure can be appropriately placed without resulting in an unacceptable environmental impact. This consideration is in line with the mitigation strategy and enables the achievement of the objectives of the mitigation hierarchy (i.e. avoid, minimise, mitigate). This application of the mitigation strategy will result in the identification of the optimised placement of the grid connection infrastructure within the grid connection corridor, which is considered to be desirable for the development

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

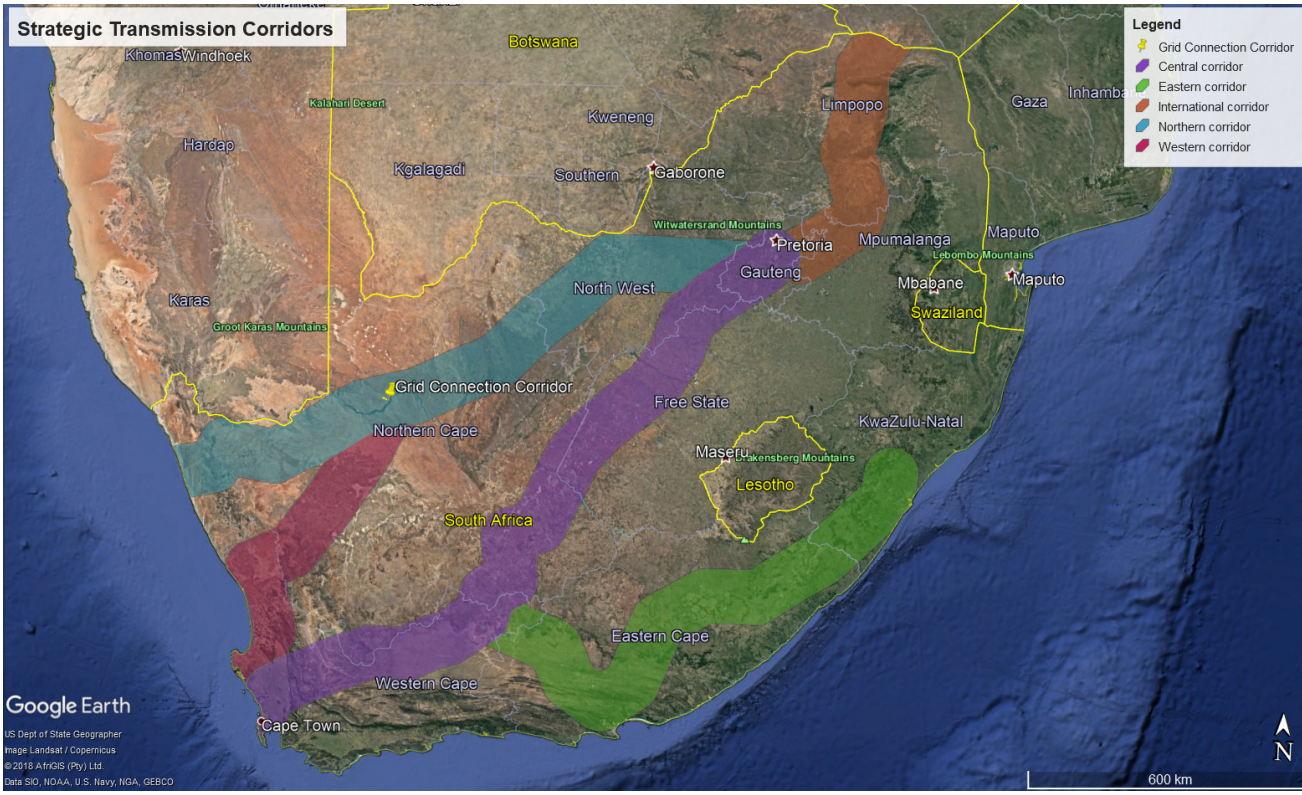

Figure 5.1: Strategic Transmission Corridors identified as the optimal locations where power infrastructure expansion is needed to enable the balancing of future demand and supply requirements, while minimising negative impacts to the environment

CHAPTER 6: APPROACH TO UNDERTAKING THE BASIC ASSESSMENT PROCESS

In terms of the EIA Regulations of December 2014 (and amended) published in terms of NEMA (Act No. 107 of 1998) as amended, the construction and operation of the grid connection infrastructure for the Khunab Solar Grid Connection is a listed activity requiring environmental authorisation. Due to the triggering of Activity 11(i) of Listing Notice 1, of the EIA Regulations, 2014 (as amended), a BA process must be undertaken in support of the application for authorisation. An application for EA was prepared and submitted to DEA, and the project was assigned an Application Reference number: **14/12/16/3/3/1/2124**.

The BA process aims at identifying and describing potential environmental issues associated with the development of the grid connection infrastructure within the 300m wide grid connection corridor. The main grid connection infrastructure includes two collector substations, each including switching station components, and a single-circuit 132kV power line, as well as associated infrastructure. In order to ensure that a comprehensive assessment is provided to the competent authority and I&APs regarding the impacts of the proposed infrastructure, detailed independent specialist studies were undertaken as part of the BA process. In addition, a comprehensive consultation process was conducted, and includes I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders. This chapter serves to outline the process that was followed during the BA process.

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

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

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for.	All listed activities triggered as a result of the development of the grid connection infrastructure have been included in section 6.2, **Table 6.1**. The specific project activity relating to the relevant triggered listed activity has also been included in **Table 6.1**.
3(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The details of the public participation process undertaken for the grid connection infrastructure have been included and described in section 6.3.2.
3(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	All comments raised during the 30-day review period of the BA Report and through consultation with I&APs has been included as part of the C&R Report (Appendix C8). The C&R Report also include the relevant responses on the submitted comments from the relevant responding party.
3(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	The methodology used to assess the significance of the impacts of the grid connection infrastructure has been included in section 6.4.

Requirement	Relevant Section
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the BA process being undertaken for the Khunab Solar Grid connection is included in section 6.5.

6.2 Relevant legislative permitting requirements

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

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

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

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

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

Table 6.1 details the listed activities in terms of the EIA Regulations of December 2014 (as amended) that apply to the development of the grid connection infrastructure, and for which an Application for Environmental Authorisation has been submitted. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 6.1: Listed activities as per the EIA regulations that are triggered by the Khunab Solar Grid Connection

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per the project description
GN 327, 08 December 2014 (as amended on 07 April 2017)	11(i)	The development of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per the project description
		The grid connection infrastructure will include the construction and operation of two collector substations, each including switching station components, and a power line for the evacuation of electricity generated by the Khunab Solar Development to the national grid. The collector substations and power line will each have a capacity of up to 132kV. The development will take place outside of urban areas.
GN 327, 08 December 2014 (as amended on 07 April 2017)	12(ii)(a)(c)	The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more; where such development occurs within (a) a watercourse and (c) within 32 meters of a watercourse, measured from the edge of a watercourse. ***The 132kV power line, associated main access roads and maintenance access roads to the grid connection infrastructure will traverse the Helbrandleegte River, which crosses the 300m grid connection corridor at the south eastern corner of the Klip Punt farm 452. The main access roads providing access to the two collector substations will cross ephemeral watercourses. This will result in infringement within the watercourse and/or within 32m of the watercourse.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more but not exceeding 500 cubic meters. ***The development and operation of the Khunab Solar Grid Connection will require infrastructure with a capacity of 80 cubic metres for the storage and handling of dangerous goods.***
GN 327, 08 December 2014 (as amended on 07 April 2017)	27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation. ***The development of the two collector substations, each including switching station components, will require the clearance of up to 1.5ha of indigenous vegetation per substation. The total clearance required will be up to 3ha. Clearance of vegetation will also be required within the power line servitude (up to 36m wide) during construction.***
GN 327, 08 December 2014 (as amended on 07 April 2017)	28(ii)	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. ***The total area of land to be developed for the two collector substations and the power line is larger than 1 hectare. The land is currently used for agricultural (i.e. grazing) purposes. Each***

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per the project description
		collector substation will have an extent of up to 1.5ha and the single-circuit power line will be ~13km in length and will be developed within a servitude of up to 36m wide.
GN 324, 08 December 2014 (as amended on 07 April 2017)	4(g)(ii)(ee)	The development of a road wider than 4 meters with a reserve less than 13,5 meters (g) in the Northern Cape (ii) outside urban areas (ii) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The Khunab Solar Grid Connection requires the development of access roads of ~4m in width for maintenance purposes during operation. The southern section of the grid connection corridor is located within a Critical Biodiversity Area 2 and an Ecological Support Area as identified in the Northern Cape Critical Biodiversity Areas Map and the Northern Cape Biodiversity Plan. The Khunab Solar Grid Connection is located outside of urban areas.***
GN 324, 08 December 2014 (as amended on 07 April 2017)	10(g)(ii)(iii)(ee)	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters (g) in the Northern Cape (ii) in areas within a watercourse or wetland, or within 100 meters from the edge of a watercourse or wetland; and (iii) outside of urban areas and (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The development of the Khunab Solar Development requires the storage and handling of dangerous goods of 80m3 to be located within the grid connection corridor.***
GN 324, 08 December 2014 (as amended on 07 April 2017)	12(g)(ii)	The clearance of an area of 300 square meters or more of indigenous vegetation (g) in the Northern Cape Province (ii) within critical biodiversity areas identified in bioregional plans. ***The development of the Khunab Solar Grid Connection requires the clearance of vegetation for the construction of the 132kV power line and the two collector substations (each with an extent of 1.5ha). The southern section of the grid connection corridor is located within a Critical Biodiversity Area 2 and an Ecological Support Area as identified in the Northern Cape Critical Biodiversity Areas Map and the Northern Cape Biodiversity Plan.***
GN 324, 08 December 2014 (as amended on 07 April 2017)	14(ii)(a)(c)(g)(ii)(ff)	The development of (ii) infrastructure or structures with a physical footprint of 10 square meters or more, where such development occurs (a) within a watercourse or (c) within 32 meters of a watercourse, measured from the edge of a watercourse (g) in the Northern Cape (ii) outside urban areas (ff) within critical biodiversity areas or ecosystem services areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per the project description
		The 132kV power line, associated main access roads and maintenance access roads to the grid connection infrastructure will need to cross the Helbrandleegte River which traverses the grid connection corridor connecting the Khunab Solar Development to the Upington MTS. The main access roads providing access to the two collector substations will cross ephemeral watercourses. This will result in infringement with the watercourse and/or within 32m of the watercourse. The southern section of the grid connection corridor is located within a Critical Biodiversity Area 2 and an Ecological Support Area as identified in the Northern Cape Critical Biodiversity Areas Map and the Northern Cape Biodiversity Plan. The Khunab Solar Grid Connection is located outside of urban areas.

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

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e. the Regional Department Water and Sanitation[17]). Water use is defined broadly and includes taking and storing water activities that reduce stream flow, waste discharges and disposals, controlled activities (activities that impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Table 6. lists those Water Uses that may be relevant to the proposed project, and which may require the registration of the water use, or licensing. The table also includes a description of those project activities that relate to the applicable Water Uses.

Table 6.2: List of applicable Water Uses published under Section 21 of NWA, as amended.

Notice No.	Activity No.	Description of Water Use
NWA (No. 36 of 1998)	Section 21 (c)	Impeding or diverting the flow of water in a watercourse. ***The Helbrandleegte River is located 4km north of the Upington MTS and traverses the grid connection corridor. The main access roads providing access to the two collector substations will cross ephemeral watercourses.***
	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***The Helbrandleegte River is located 4km north of the Upington MTS and traverses the grid connection corridor. The***

[17] Soon to be known as the Regional Department of Human Settlements, Water and Sanitation.

Notice No.	Activity No.	Description of Water Use
		main access roads providing access to the two collector substations will cross ephemeral watercourses.

In the event that the flow of water in the Helbrandleegte River or the ephemeral watercourses is affected and the bed, banks or course characteristics are altered, application would need to be made for a Water Use License (WUL) in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GNR 267), or a General Authorisation (GA) registered in accordance with the requirements of Revision of General Authorisation. The process of applying for a WUL or GA registration will only be completed once a positive EA has been obtained. This is in line with the requirements of the Department of Water and Sanitation (soon to be known as the Department of Human Settlements, Water and Sanitation).

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

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

Section 38: Heritage Resources Management

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

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

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

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

6.3 Overview of the Basic Assessment Process for the Khunab Solar Grid Connection

Key tasks undertaken for the BA included:

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

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

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

In terms of GN R779 of 01 July 2016, the National Department of Environmental Affairs (DEA), soon to be Department of Environment, Forestry and Fisheries (DEFF), has been determined as the Competent Authority for all projects that relate to the Integrated Resource Plan for Electricity (IRP) 2010 – 2030, and any updates thereto. As the Khunab Solar Grid Connection is necessary associated infrastructure for the Khunab Solar Development, the DEA will be the competent authority. Through the decision-making process, the DEA will be supported by the Northern Cape Department of Environment and Nature Conservation (DENC) as a commenting authority.

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

- Submission of the project notification letters and application form for Environmental Authorisation to the DEA and DENC.
- Submission of the BA Report for review and comment by:
  - The competent and commenting authorities.
  - State departments that administer laws relating to a matter affecting the environment relevant to an application for Environmental Authorisation.
  - Organs of State that have jurisdiction in respect of the activity to which the application relates.

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

An authority site visit was undertaken for the Khunab Solar Development which includes the four solar PV facilities that the Khunab Solar Grid Connection is proposed to cater for in terms of a grid connection solution. This site visit was undertaken on the 3rd of December which was attended by officials from the DEA consisting mainly of case officers. During the site visit the Khunab Solar Grid Connection project was also discussed even though an application for Environmental Authorisation had not been submitted at this time. Therefore, the department was consulted on the proposed project, prior to the release of the BA report for review and comment. The following officials attended the site visit:

- Constance Musemburi
- Zesipho Makhosayafana
- Thulisile Nyalunga

Comments have been received from the DEA on the Khunab Solar Grid Connection Project, dated 14 February 2020. These comments have been included in **Appendix C6** and **Appendix B** and included and responded to in the comments and responses report (**Appendix C8**). The table below also includes the comments received and the EAP's responses to the comments.

DEA Comments	**EAP Response**
The Department has the following comments: **Application form:** • Page 6 of the application form mentions that the proposed development forms part of an Electricity Grid infrastructure (EGI) as per GN 113 i.e. Strategic Transmission Corridor: Northern Corridor. Please refer to the schedule in the Notice carefully. The following is important to note: • Your application, based on the description provided, does not trigger Activity 9 of Listing Notice 2 and neither has it been included in the application form. The application form and Draft BAR mention a 132kV distribution power line. • A pre-negotiated route with landowners is required. It is unclear whether the corridor provided can be considered as a pre-negotiated route.	The development of the Khunab Solar Grid Connection does not trigger Activity 9 of Listing Notice 2 (GNR 325), however the activity does trigger Listing Notice 1, Activity 11(i) (GNR 327)which has been applied for. The relevance of the mentioning of the Northern Corridor of the Strategic Transmission Corridors, as per GN 113, is the location of the assessed grid connection corridor within the Northern Corridor. Considering the fact that the power line will have a capacity of up to 132kV, the process related to GN113 is not applicable. Rather the stipulated BA process and the pre-scribed timeframes as indicated in the EIA Regulations, 2014 (as amended), is relevant and has been followed for the Khunab Solar Grid Connection. As a 300m wide grid connection corridor has been assessed for the placement of the proposed power line and no pre-negotiated route within the assessed corridor is available at this stage. The wider corridor was assessed in order to enable the applicant to avoid any environmental sensitivities present within corridor through the careful placement of the infrastructure. The final negotiated route of the power line, including the towers, to be placed within the grid connection corridor will be submitted to the DEA for approval prior to commencement of the activities.
Landowner consent has not been provided, instead, the notification letter to the landowner has been included.	The signed landowners consent was provided in **Appendix 3** of the EA application form. However to avoid

	any confusion a new consent letter will be contained in the Final BA Report under **Appendix P**.
Based on the above, the application does not follow GN 113 and you are advised to ascertain whether this application will revert to a standard application for environmental authorisation with the timeframes stipulated in Regulation 19 of the EIA Regulations, 2014, as amended.	The application will revert to a standard environmental authorisation as per the pre-scribed timeframes stipulated in Regulation 19 of the EIA Regulations 2014 (as amended).
Listed Activities • Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Kindly distinguish between the areas of land to be cleared that is already disturbed and indigenous area (in m2).	All listed activities applied for in the Application for Environmental Authorisation and included in Chapter 6, Table 6.1 are relevant to the proposed development, are specific and are linked to the project description. The development of the two collector substations, each including switching station components, will require the clearance of up to 1.5ha (15000m^2) of indigenous vegetation per substation. The total clearance required will be up to 3ha (30000m^2). Clearance of indigenous vegetation will also be required within the power line servitude (up to 36m wide) during construction, however the clearance of indigenous vegetation for the undertaking of linear activities is excluded, as per the EIA Regulations, 2014 (as amended). Therefore, a total of up to 3ha (30000m^2) will be cleared. Disturbed land to be cleared will be limited within the grid connection corridor and would be less than 1ha (10000m^2) in total.
For each listed activity, where possible, provide the proposed threshold/footprint associated with the listed activity i.e. the footprint of infrastructure in m2, the removal of material in m3, the clearance of land in m2 etc.	A description for each listed activity in terms of the required threshold, as per the activity in question, has been included in the Application for Environmental Authorisation and included in Chapter 6, Table 6.1.
Kindly provide further information with regards to Activity 14 of Listing Notice 1 i.e. dangerous goods will be stored on site.	The development and operation of the Khunab Solar Grid Connection will require infrastructure with a capacity of 80 cubic metres for the storage and handling of dangerous goods. The dangerous goods to be stored and handled typically includes flammable and combustible liquids such oils associated with the sub-station transformers , lubricants and solvents.
If the activities applied for in the application form differ from those mentioned in the final BAR, an amended application form must be submitted reflecting this.	The listed activities applied for in the Application for Environmental Authorisation are the same as the listed activities included in the final BA Report, Chapter 6, Table 6.1. Therefore, the submission of an amended application is not required.
Project Description Kindly provide further detail on the proposed access roads (main access and maintenance access roads) to be built as part of the proposed project.	Further detail regarding the access roads in particular to main access roads and maintenance roads to be built as part of the proposed project is included in Chapter 2, item 2.2.1 'Project Site (ie Grid Connection Corridor)' and **Table 2.1.**

Public Participation Process • The following information must be submitted with the Final BAR: Please ensure that all issues raised and comments received during the circulation of the draft BAR from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed and included in the final BAR. Proof of correspondence with the various stakeholders must be included in the final BAR (including but not limited to the National Department of Environmental Affairs (DEA): Biodiversity and Conservation. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. Please note that comments received from this Department must also form part of the comment and response report and all comments must be adequately addressed and included in the final report.	All comments received from I&APs and organs of state during the BA process are included in **Appendix C6** of the final BA Report and these comments have been incorporated into this C&R Report attached as **Appendix C8** of the final BA Report. Where applicable, comments received have been utilised in the preparation and finalisation of the BA Report. The letter in which the Department of Environmental Affairs (DEA): Biodiversity and Conservation comments were received is included in **Appendix C6** of the final BA Report and captured in the C&RR in item 6 below. Proof of correspondence with organs of state and various stakeholders is included in **Appendix C4** (organs of state correspondence) and **Appendix C5** (I&AP correspondence) of the final BA Report. Proof of attempts that were made to obtain comments is included in **Appendix C4** (organs of state correspondence) and **Appendix C5** (I&AP correspondence) of the final BA Report. The comments submitted by the DEA is captured in this C&RR and included in **Appendix 8**and **Appendix C6** of the final BA Report.
A Comments and Response trail report (C&R) must be submitted with the final BAR. The C&R report must incorporate all comments for this development. Please refrain from summarising comments made by Interested and Affected Parties (I&APs). All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&AP's comments.	All written comments from Organs of State and I&APs received, with the responses from the EAP and/or Applicant (as applicable) are included in this C&R Report and attached as **Appendix C8** of the final BA Report. Comments captured are *verbatim* and have not been summarised. Detailed responses to the comments have been provided by the EAP, Applicant and/or Specialists as required by the content of the comment.
Specialist Assessments You are requested to submit original signed Specialist Declaration of Interest forms (completed in full) for each specialist study conducted. The forms have been updated and are available on Departments website (please use the Department's template).	The comment has been noted, the original signed Specialist Declarations of Interest Forms, as per the Department's template, will be included in the final BA Report in **Appendix N**.
Environmental Management Programme (EMPr) The Generic EMPr for the powerline and substation (Part B: Section 2) must be originally signed by the proponent or applicant and submitted with the final BAR.	The applicant/proponent are only required to sign the generic EMPrs once the contractor has been appointed and has provided inputs to these Generic EMPrs, as per the requirements of the EMPr templates (refer to section 7.3 of the generic EMPRs included as **Appendix K1 and Appendix K2** of the final BA Report. It must be noted that the appointment of contractors can only commence once the project receives EA and preferred bidder status has been granted. Therefore, signature of the Generic EMPRs is not currently possible.

General You are further reminded that the final BAR to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of basic assessment reports in accordance with Appendix 1 and Regulation 19(1) of the EIA Regulations, 2014 as amended. Ensure that one USB copy of the final BAR and all relevant appendices accompanies the hard copy document.	This comment has been noted and all the requirements contained in Appendix 1 of Regulation 19(1) of the EIA Regulations have been complied with as part of the final BA Report. An electronic copy of the final BA Report on a USB will be accompanied with the hard copy report.
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 as per the Appendix 1(3)(1)(q) of the NEMA EIA Regulations, 2014, as amended.	The Environmental Authorisation would be required for a period of 7 years from the date of approval. The operation phase of the proposed Khunab Solar Grid Connection would be scheduled to take place approximately 18 months post financial close within the DMRE REIPPPP.
• You are further reminded to comply with Regulation 19(1) (a) of the NEMA EIA Regulations, 2014, as amended, which states that: • "Where basic assessment must be applied to an application, the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority - • (a) a basic assessment report, inclusive of specialist reports, an EMPr, and where applicable a closure plan, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority." • Should there be significant changes or new information that has been added to the BAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are therefore required to comply with Regulation 19(b) of the NEMA EIA Regulations, 2014, as amended, which states: • "the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority — (b) a notification in writing that the basic assessment report, inclusive of specialist reports an EMPr, and where applicable, a closure plan, will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the basic assessment report or EMPr or, where applicable, a closure plan, which changes or information was not contained in the reports or plans consulted on during the initial public participation process contemplated in sub-regulation (1)(a) and that the revised reports or, EMPr or, where applicable, a closure plan will be subjected to another public participation process of at least 30 days".	This comment has been noted and Regulation 19(1) (a) of the NEMA EIA Regulations, 2014 is complied with. No significant changes or new information is applicable to the Khunab Solar Grid Connection and therefore Regulation 19(b) of the EIA Regulations, 2014, as amended, is not applicable.

Should you fail to meet any of the timeframes stipulated in Regulation 19 of the NEMA EIA Regulations, 2014, as amended, your application will lapse.	This comment has been noted. The final BA Report has been submitted to the competent authority well within the pre-scribed timeframes stipulated in Regulation 19 of the EIA Regulations, 2014, as amended.
You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.	This comment has been noted, no response required.

6.3.2. Public Participation Process

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

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the BA process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding the BA process in the following ways:

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

During the decision-making phase:
- to advise I&APs of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

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

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

- Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
  - (i) the site where the activity to which the application relates is or is to be undertaken; and
  - (ii) any alternative site mentioned in the application;
- Give written notice to:
  - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
  - (v) the municipality which has jurisdiction in the area;
  - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
  - (vii) any other party as required by the competent authority.
- Place an advertisement in one local newspaper.
- Open and maintain a register of I&APs and Organs of State.
- Hold Focus Group Meetings and a Public Meeting prior to the release of the BA Report for a 30-day review period.
- Prepare a Comments and Responses (C&R) Report which documents the comments received on the BA process and the responses provided by the project team prior to the release of the BA Report for a 30-day review period.
- Release a BA Report for a 30-day review period.
- Update the C&R Report with all comments raised during the 30-day review period for submission with the final BA Report.

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

i. Stakeholder identification and Register of Interested and Affected Parties

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

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater study area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database.

Other stakeholders and/or I&APs are required to formally register their interest in the project. An initial list of key stakeholders identified and registered is listed in **Table 6.3**.

Table 6.3: List of Stakeholders identified for the inclusion in the project database during the public participation process for the Khunab Solar Grid Connection.

Organs of State
National Government Departments
Department of Environmental Affairs (DEA)[18]
Department of Mineral Resources(DMR)[19]
Department of Rural Development and Land Reform (DRDLR)[20]
Department of Water and Sanitation (DWS)[21]
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
Provincial Government Departments
Northern Cape Department of Agriculture
Northern Cape Department of Environment and Nature Conservation (DENC)
Northern Cape Department of Roads and Public Works
Ngwao Boswa Kapa Bokone (NBKB)
Local Government Departments
ZF Mgcawu District Municipality
Kai !Garib Local Municipality
Dawid Kruiper Local Municipality
Key Stakeholders
BirdLife South Africa
Endangered Wildlife Trust (EWT)
Wildlife and Environment Society of South Africa (WESSA)
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

[18] DEA soon to be known as Department of Environment, Forestry and Fisheries

[19] DMR soon to be Department of Mineral Resources and Energy

[20] DRDLR soon to be known as Department of Agriculture, Land Reform and Rural Development

[21] DWS soon to be known as Department of Human Settlements, Water and Sanitation

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names[22], contact details and addresses of:

- all persons who requested to be registered on the database in writing and disclosed their interest in the project;
- all Organs of State which hold jurisdiction in respect of the activity to which the application relates;
- all persons identified and approached through networking or a chain referral system to identify any other stakeholder (i.e. ratepayers associations); and
- all persons who submitted written comments or attended meetings during the public participation process.

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

ii. Advertisements and Notifications

40.(2)(a)	Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of – » (i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and (ii) Any alternative site.
40.(2)(b)	Giving written notice, in any of the manners provided for in section 47D[23] of the Act, to – » (i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site

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

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

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

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

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

- Compilation of a background information document (BID) providing technical and environmental details on this project (in the context of the project) and how to become involved in the BA process (refer to **Appendix C3**). The BID was distributed on 09 October 2019 via email to identified and registered stakeholders and I&APs. The BID is also available electronically on the Savannah Environmental website (http://www.savannahsa.com/public-documents/energy-generation).
- Placement of site notices regarding the BA process at visible points along the affected properties of the grid connection corridor, in accordance with the requirements of the EIA Regulations, on 16 October 2019. Photographs and the GPS co-ordinates of the site notices are contained in **Appendix C2**.
- Placement of notices regarding the BA process at the Upington Public Library and the Keimoes Public Library on 16 October 2019. Photographs and the GPS co-ordinates of the notices are contained in **Appendix C2.**
- The BID and BA process notification letters announcing the BA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/I&APs of the Khunab Solar Grid Connection, providing background information of the project and inviting I&APs to register on the project database, were distributed via email on 09 October 2019. The evidence of the distribution of the process notification letters are contained in **Appendix C** of the BA Report.
- Placement of advertisement, in Afrikaans, announcing the BA process and the availability of and inviting comment on the BA Report in Gemsbok Newspaper on 15 January 2020 at the commencement of the 30-day review period. This advert also included the details on the review period for the BA report and the location of where the report can be accessed. The details of the newspaper advert placement will be contained in **Appendix C2** of the final BA Report.

» The BA Report was made available for review by I&APs for a 30-day review period from **15 January 2020 to 14th February 2020**. CD and hard copy versions of the BA Report were circulated to Organs of State via courier at the commencement of the review period. The BA Report was also available on the Savannah Environmental website and hard copies of the report were placed at the Upington and Keimoes public libraries. The evidence of distribution of the BA Report will be included in the final BA Report, which will be submitted to the DEA.

iii. Public Involvement and Consultation

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

Table 6.4: Consultation undertaken for the Khunab Solar Grid Connection

Activity	Date
Distribution of the process notification and stakeholder reply form announcing the BA process and inviting I&APs to register on the project database.	9 October 2019
Distribution of the BID	9 October 2019
Placement of site notices on-site and in public places (including the Upington Public Library and the Keimoes Public Library)	16 October 2019
Focus Group Meetings: Authorities and Key Stakeholders (including organs of state, local municipality and community-based organisations) (The Khunab Solar Grid Connection was presented and discussed as part of the Focus Group Meeting undertaken for Khunab Solar Development)	28 November 2019
Public Meeting Kalksloot Communtiy Hall, Druiwe Street, Erven 774 Upington (The Khunab Solar Grid Connection was presented and discussed as part of the Public Meeting undertaken for Khunab Solar Development)	28 November 2019
Distribution of notification letters announcing the availability of the BA Report for review for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the greater study area (including neighbouring landowners) and key stakeholder groups.	10 January 2020
Advertising of the availability of the BA Report for a 30-day review period in Gemsbok newspaper.	15 January 2020
30-day review period of the BA Report	15 January 2020– 14 February 2020
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs	Throughout BA process

The purpose of the abovementioned meetings was to engage with key stakeholders to ensure that key requirements/comments are noted and addressed as part of the BA process and included as part of the BA Report prior to release for the 30-day review period. The undertaking of the meetings prior to the release of the BA Report for a 30-day review period provided the EAP with an opportunity to understand and consider issues from I&APs as part of the report from the outset of the process. This also provided an opportunity for

open engagement where I&APs could provide comments or raise concerns verbally in the language they choose. Records of all consultation undertaken are included in **Appendix C**.

It must be noted that the meetings held fully covered both the Khunab Solar Development and the Khunab Solar Grid Connection. The following main comments were raised as part of the meetings (refer to **Appendix C7)** and have been considered as part of this final BA Report.

- Integrated development must be undertaken between the Khunab Solar Development and the Khunab Solar Grid Connection, specifically road infrastructure.
- The work undertaken between the projects must be consolidated in terms of social development and not undertaken in isolation.
- The project developer must engage with the community once the Khunab Solar Development (including the associated Khunab Solar Grid Connection) receives preferred bidder status.

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

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

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

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

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

(a) A lack of skills to read or write;
(b) Disability; or
(c) Any other disadvantage;

Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database have been notified by means of a notification letter (e-mail) of the release of the BA Report for a 30-day review period, invited to provide comment on the BA Report, and informed of the manner in which, and timeframe within which such comment must be made. The notification was distributed prior to commencement of the 30-day review period, on 10 January 2020. Opportunities for face to face consultation have been provided through the holding of a public meeting and focus group meetings prior to the 30-day review period which provided the I&APs with a platform to verbally raise their concerns and comments on the proposed development.

v. Identification and Recording of Comments

Comments raised by I&APs over the duration of the BA process has been synthesised into a C&R Report which is included in **Appendix C8** of the final BA Report. The C&R Report includes detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised prior to the release of the 30-day review period. The C&R Report has been updated with all comments received

during the 30-day review period and will be included as **Appendix C8** in the final BA Report that will be submitted to the DEA for decision-making.
Meeting notes of all the meetings conducted prior to the 30-day review period of the BA Report have been included in **Appendix C7**.

6.4 Assessment of Impacts Identified through the BA Process

Impacts identified as requiring investigation, as well as the specialist consultants involved in the assessment of these impacts are indicated in **Table 6.5** below.

Table 6.5: Specialist consultants appointed to evaluate the potential impacts associated with the Khunab Solar Grid Connection

Specialist Name	Specialist Company	Specialist Area of Expertise	Appendices
Simon Todd	3Foxes Biodiversity Consulting (Pty) Ltd	Ecology	Appendix D
Eric Hermann	3Foxes Biodiversity Consulting (Pty) Ltd	Avifauna	Appendix E
Brian Colloty	EnviroSci (Pty) Ltd	Freshwater (Specialist Input letter)	Appendix F
Marinè Pienaar	TerraAfrica (Pty) Ltd	Soils and Agricultural Potential	Appendix G
Jenna Lavin	CTS Heritage (Pty) Ltd	Heritage (including archaeology and palaeobtology)	Appendix H
Jon Marshall	Environmental Planning and Design (Pty) Ltd	Visual Impact Assessment	Appendix I
Lisa Opperman and Neville Bews	Savannah Environmental (Pty) Ltd and Neville Bews & Associates	Social Environment	Appendix J

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

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected;
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high);
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4;
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease);

- 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

» The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
- Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
- Assigned a score of 2 is improbable (some possibility, but low likelihood);
- Assigned a score of 3 is probable (distinct possibility);
- Assigned a score of 4 is highly probable (most likely);
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
» The **status**, which is described as either positive, negative or neutral;
» The degree to which the impact can be reversed;
» The degree to which the impact may cause irreplaceable loss of resources;
» The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M) P; where

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

The **significance weightings** for each potential impact are as follows:

» **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);
» **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated);
» **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

As the proponent has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations, 2014 (as amended), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. Generic Environmental Management Programmes, contemplated in Regulation 19(4) of the EIA Regulations, 2014 (as amended) and as per GNR 435 of 22 March 2019 is used for the BA for the Khunab Solar Grid Connection. This is due to the triggering of activity 11 of Listing Notice 1 of the EIA Regulations, 2014 (as amended). The generic EMPr for substation infrastructure for electricity transmission and distribution and the generic EMPr for overhead electricity transmission and distribution infrastructure is included in **Appendix K** of this BA Report.

6.5 Assumptions and Limitations of the BA Process

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

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

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

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

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

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

Table 6.6 provides an outline of the legislative permitting requirements applicable to the grid connection infrastructure as identified at this stage in the project process.

Table 6.6: Applicable Legislation, Policies and/or Guidelines associated with the development of the Grid Connection Infrastructure

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* * *Prevent pollution and ecological degradation,* * *Promote conservation, and* * *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed development are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. A Basic Assessment Process is required to be undertaken for the proposed project.	DEA (soon to be known as DEFF) – Competent Authority Northern Cape Department of Environment and Nature Conservation (DENC) – Commenting Authority	The listed activities triggered by the proposed project have been identified and are assessed throughout the BA process for the grid connection infrastructure. The BA process will culminate in the submission of a final BA Report to the competent authority in support of the Application for Environmental Authorisation.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DEA (soon to be known as DEFF) Northern Cape DENC	While no permitting or licensing requirements arise directly by virtue of the proposed grid connection infrastructure, this section finds application through the consideration of potential cumulative, direct, and indirect impacts.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DEA (soon to be known as DEFF) Northern Cape DENC Kai !Garib Local Municipality Dawid Kruiper Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the location of the grid connection corridor in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible	Regional Department of Water and Sanitation	The Helbrandleegte River is located 4km north of the Upington MTS and traverses the grid connection corridor. The main access

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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			might be present within the grid connection corridor.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.	Northern Cape DENC / ZF Mgcawu District Municipality	In the event that the construction of the grid connection infrastructure results in the generation of excessive levels of dust, the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed. However, with mitigation measures implemented, construction of the grid connection infrastructure is not anticipated to result in significant dust generation.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority. Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority	South African Heritage Resources Agency Ngwao Boswa Kapa Bokone (NBKB)	A full Heritage Impact Assessment (HIA) (with field work) has been undertaken as part of the BA process (refer to **Appendix H** of this BA Report). The HIA considers impacts on both archaeology, heritage and palaeontology. The grid connection infrastructure will not have a negative impact on the heritage resources situated in the grid connection corridor. The lithic and historic material identified within the grid connection corridor is of low significance, and even though the resources may be destroyed

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	and furnish it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		during the construction phase, the impact is inconsequential. Should a heritage resource be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone (NBKB) in accordance with Section 48 of the NHRA, and the SAHRA Permit Regulations (GNR 668). This will be determined once the final location of the grid connection infrastructure within the grid connection corridor has been determined.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National	DEA (soon to be known as DEFF) Northern Cape DENC	Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species. The Ecological Impact Assessment (**Appendix D)** identified several protected species occur within the grid connection corridor which may be impacted by the development of the Khunab Solar Grid Connection, most notably *Vachellia erioloba*, *Boscia albitrunca* and *Boscia foetida* subsp. *foetida.* The density of these species within the corridor is however low and *Vachellia erioloba* and *Boscia albitrunca* are restricted to the Helbrandleegte River.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DEA (soon to be known as DEFF) Northern Cape DENC	Restricted Activities and the respective requirements applicable to persons in control of different categories of listed invasive species are contained within the Alien and Invasive Species Regulations (GNR 598) published under NEM:BA, together with the requirements of the Risk Assessment to be undertaken. The Ecological Impact Assessment (**Appendix D**) identified some localised areas of *Prosopis* invasion within the grid connection corridor but in general there are few alien species present across most of the corridor and surrounding area and it can be considered to be largely intact and in moderate condition. The EMPr **(Appendix K)** does make provision for mitigation measures for alien vegetation present within the grid connection corridor.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GNR 1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur.	Department of Agriculture, Forestry and Fisheries	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Regulation 15E of GNR 1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.		In terms of Regulation 15E (GNR 1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods: » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation (4). » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the	DEA (soon to be DEFF)	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".		protected tree species present in the grid connection corridor that cannot be reasonably avoided for the submission of relevant permits to authorities prior to the disturbance of these individuals. The Ecological Impact Assessment undertaken as part of the BA Report included a site visit which allowed for the identification of any protected tree species that may require a license in terms of the NFA within the project development corridors (refer to **Appendix D** of this BA Report). The Ecological Impact Assessment (**Appendix D**) identified two NFA-protected tree species which occur within the grid connection corridor, namely *Vachellia (Acacia) erioloba* and *Boscia albitrunca*. Numbers of these species within the grid connection corridor are however low and the local populations of these species would be not be compromised.
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is	DAFF(soon to be ALR)	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the grid connection infrastructure, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and personnel for firefighting purposes.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.		
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material.	Department of Health	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may present with the development of the grid connection infrastructure and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented.	DEA (soon to be DEFF) – Hazardous Waste Northern Cape DENC – general waste	No listed activities are triggered by the grid connection infrastructure and therefore no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation of the grid connection infrastructure. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard.
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on	SANRAL – national roads Northern Cape DoT	An abnormal load / vehicle permit may be required to transport the various components to site for construction. These

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads (transport vehicles exceeding the dimensional limitations (length) of 22m). Depending on the trailer configuration and height when loaded, some of the collector substation components may not meet specified dimensional limitations (height and width) and will therefore require a permit.
Provincial Policies / Legislation			
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged;	Northern Cape DENC	A collection/destruction permit must be obtained from Northern Cape Nature Conservation for the removal of any protected plant or animal species found on site. A permit could possibly be required for the removal of the two NFA-protected tree species which occur within the grid connection corridor, namely *Vachellia (Acacia) erioloba* and *Boscia albitrunca*. As well as the relocation of the two listed terrestrial mammals that may occur at the site, the Brown Hyaena *Hyaena brunnea* (Near Threatened) and Black-footed cat

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	» The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Act provides lists of protected species for the Province.		*Felis nigripes* (Vulnerable). While it is possible that both species may occur within the grid connection corridor, it is least likely that the Brown Hyaena *brunnea* may be more present as this species is often purposely or inadvertently persecuted within farming areas. Refer to the Ecological Impact Assessment (**Appendix D**).

CHAPTER 7: DESCRIPTION OF THE RECEIVING ENVIRONMENT

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

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

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

Requirement	Relevant Section
3(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, heritage and cultural aspects	The environmental attributes associated with the grid connection corridor and the broader environment are described and considered within this chapter and include the following:
	» The regional setting within which the grid connection corridor is located is described in section 7.2.
	» The climatic conditions of the Upington area are described in section 7.4.
	» The biophysical characteristics of the broader study area and the surrounding areas, as well as for the grid connection corridor, are described in section 7.5. This includes the topography, soils and agricultural potential, the ecological profile (including fauna, flora and avifauna) of the broader study and the grid connection corridor.
	» The heritage of the affected environment (including archaeology, palaeontology and cultural landscape) is discussed in section 7.6.
	» The visual quality of the affected environment is discussed in section 7.7.
	» The social context within which the grid connection corridor is located is described in section 7.8.

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

7.2. Regional setting

The Northern Cape Province is located in the north-western extent of South Africa and constitutes South Africa's largest province, occupying an area of 372 889km² in extent, equivalent to nearly a third (30.5%) of the country's total land mass. It is also South Africa's most sparsely populated province with a population of 1, 145, 861, and a population density of 3.1/km². The capital city is Kimberley, and other important towns

include Upington, Springbok, Kuruman, De Aar and Sutherland. It is bordered by the Western Cape, and Eastern Cape Provinces to the south, and south-east, Free State, and North West Provinces to the east, Botswana and Namibia, to the north, and the Atlantic Ocean to the west. The Northern Cape is the only South African province which borders Namibia and plays an important role in terms of providing linkages between Namibia and the rest of South Africa. The Orange River, which is South Africa's largest river, is a significant feature and is also the main source of water in the Province, while also constituting the international border between the Northern Cape (i.e. South Africa) and Namibia.

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

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

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

The Northern Cape is made up by 5 district municipalities, namely Francis Baard, John Taolo Gaetsewe, Namakwa, Pixley ka Seme and ZF Mgcawu (refer to **Figure 7.1**).

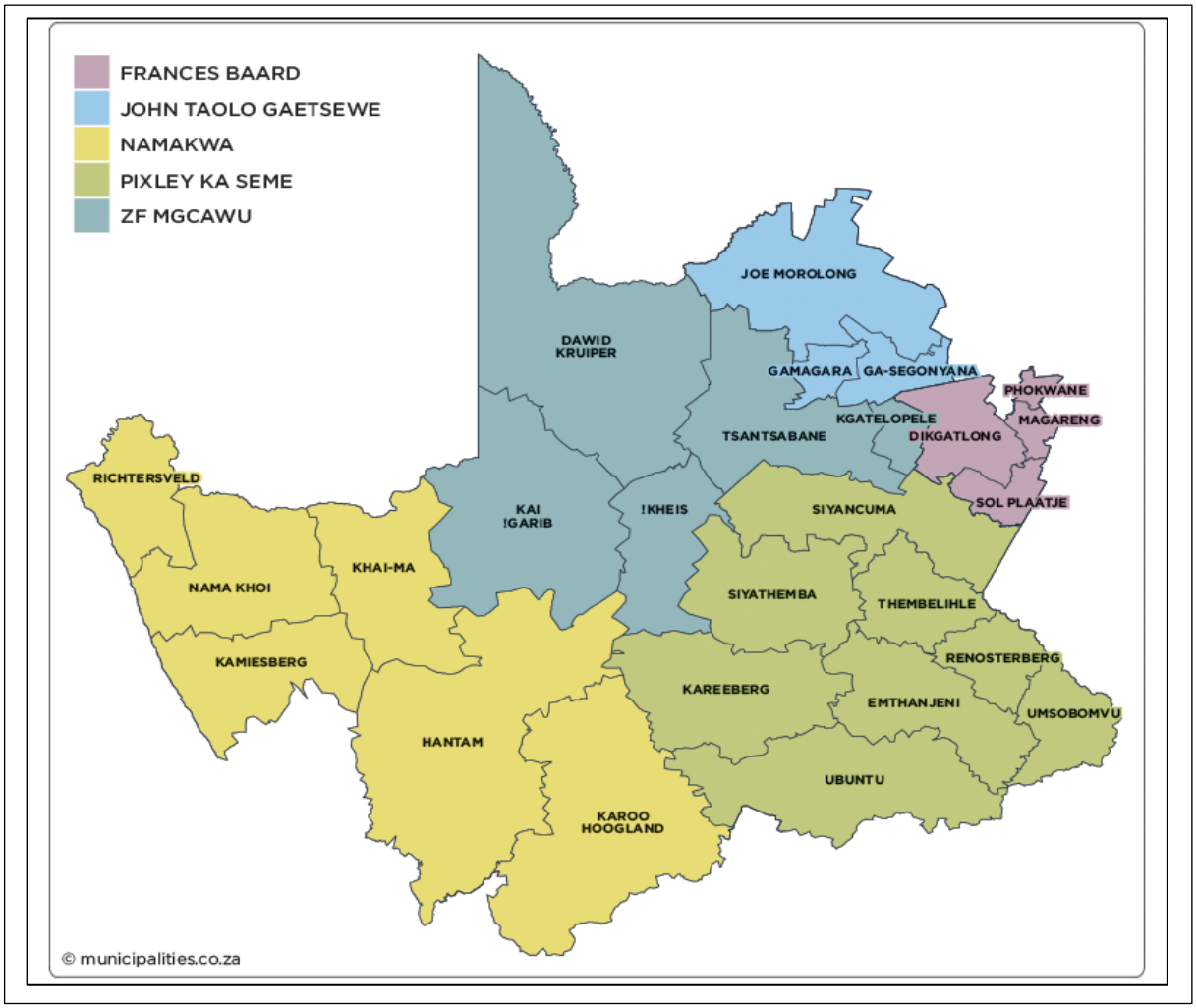

Figure 7.1: District municipalities of the Northern Cape Province (Source: Municipalities of South Africa).

The ZF Mgcawu District Municipality[24] (DM) is situated in the north-central extent of Northern Cape Province, and is bordered by the Namakwa DM to the south-west and south, the Pixley ka Seme DM to the south and south-east, the Frances Baard and John Taolo Gaetsewe DM to the east, Botswana to the north, and Namibia to the west. The ZF Mgcawu DM occupies an area of land of approximately 102 484km² in extent, which is equivalent to over one quarter (approximately 27%) of the Northern Cape Province. Approximately 65 000km² of the DM's land mass comprises of the Kalahari Desert, Kgalagadi Transfrontier Park, and the former Bushman Land.

Upington is the administrative capital of the ZF Mgcawu DM, Kai !Garib LM and Dawid Kruiper LM, and is also the largest town within the LM and DM. The town is located on the banks of the Orange River and is the centre of the karakul sheep and dried-fruit industries and is also the most northerly winemaking region in South Africa.

[24] Previously known as the Siyanda District Municipality

The ZF Mgcawu DM includes the town of Upington, which is the capital of the DM, and where the DM's seat of government is located. Other prominent cities and towns located within the DM include, Beeshoek, Brandboom, Danielskuil, Eksteenskuil, Groblershoop, Kakamas, Keimoes, Kenhardt, Lime Acres, Mier, Postmasburg, and Rietfontein. The main economic activities within the DM include agriculture, mining, and tourism.

The ZF Mgcawu DM comprises five (5) local municipalities (LMs), namely Dawid Kruiper, Kai !Garib, Tsantsabane, Kheis and Kgatelopele (refer to **Figure 7.2**).

Figure 7.2: Local Municipalities of the ZF Mgcawu DM (Source: Municipalities of South Africa).

The broader study area for the Khunab Grid Connection Corridor is located within the Kai !Garib LM and the Dawid Kruiper LM. The Kai !Garib LM is a Category B[25] municipality and is situated along the Orange River within the ZF Mgcawu DM. The Kai !Garib LM is the second-largest of the five (5) LMs, with an extent of 26 377km^2, accounting for a quarter of the DMs geographical area[26]. The key towns within the LM include, Eksteenskuil, Kakamas, Keimoes and Kenhardt. The agriculture sector with 52%, is the biggest contributor of the LM's GDP and of great importance to the economy of the ZF Mgcawu DM. The government and services sector contribute 16%, the wholesale and retail trade sector 11%, the financial services sector 7.6% and the manufacturing sector 5%.

The Dawid Kruiper LM was established by the amalgamation of the Mier LM and //Khara Hais LM on 3 August 2016, and is located in the northern extent of the ZF Mgcawu DM. The Dawid Kruiper LM is bordered by the Kai !Garib and !Kheis LMs to the south, the Tsantsabane LM to the south-east, Botswana to the north-east and north, and Namibia to the west. The LM occupies an area of land approximately 44 231km^2 in extent and is the largest of the five LMs which make up the ZF Mgcawu DM, occupying an area equivalent to approximately 43% of the ZF Mgcawu DM.

The Kgalagadi Transfrontier Park is located in the northern extent of the LM. The LM is also home to the Khomani San community, who are descended from several original San groups.

The Dawid Kruiper LM is the commercial, educational, military, agricultural, medical, transport and tourism centre of the area. Upington comprises the administrative and economic centre of the LM and is also the largest town within the LM. Other prominent cities and towns located within the LM include Mier and Rietfontein. The main economic sectors within the LM include agriculture, business services, game farming, tourism and hospitality, manufacturing, transport, community services, social and personal services.

The majority of the area is sparsely populated and consists of an undulating landscape of wide-open expanses. The local population is primarily concentrated in the town of Upington and smaller towns or settlements along the Orange River.

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

There are no formal residences or homesteads within the broader study area, however; the area borders the existing Khi Solar One (CSP) boundary to the south-east and the four (4) Sirius Solar PV Projects to the south, one of which is currently under construction. **Figure 7.3** illustrates the affected and surrounding landowners of the Khunab Solar Grid Connection.

The corridor is located approximately 20km south-west of Upington, and 22km north-east of Keimoes. Settlement areas located in the vicinity of the corridor include Ses Brugge, Klippunt, Dyasons Klip Settlement, Oranjevallei, Louisvale, and Kanoneiland. These communities are considered to be low-income

[25] A municipality that shares municipal executive and legislative authority in its area with a District Municipality within whose area it falls: https://www.brandsouthafrica.com/governance/government/south-african-local-and-municipal-governments
[26] https://municipalities.co.za/overview/1183/kai-garib-local-municipality

communities housed in low cost and informal housing. The residents of these settlements are employed largely by the local agricultural sector, specifically viticulture and fruit farms and associated manufacturing facilities. The employment opportunities are therefore largely seasonal.

The general area within which the corridor is located is sparsely populated (with the Kai !Garib LM having a population density of approximately 2.5/km² and Dawid Kruiper LM having a population density of 3.1/km²).

The area surrounding the broader study area is characterised as a semi-arid desert region. The vegetation cover within the area is restricted to low shrublands, described as the Kalahari Karroid Shrubland and the Gordonia Duneveld. Vineyard and cotton field plantations are found along the banks of the Orange River located to the south of the grid connection corridor and towards Keimoes located to the west.

Major linear infrastructure within the surrounding area of the grid connection corridor includes the N14 national and Lutzputs gravel roads, a railway line which runs along the N14 national road from Keimoes towards Upington and existing grid connection infrastructure. Some of these include:

» Mctaggerts-Oasis 1 132kV overhead power line;
» Klipkraal-Upington 2 132kV overhead power line and
» Gordonia-Upington 1 132kV overhead power line.

The Augrabies National Park, a major tourist destination in the Northern Cape Province is located 120km east of Upington and is located within the Kai !Garib LM near the town of Kakamas.

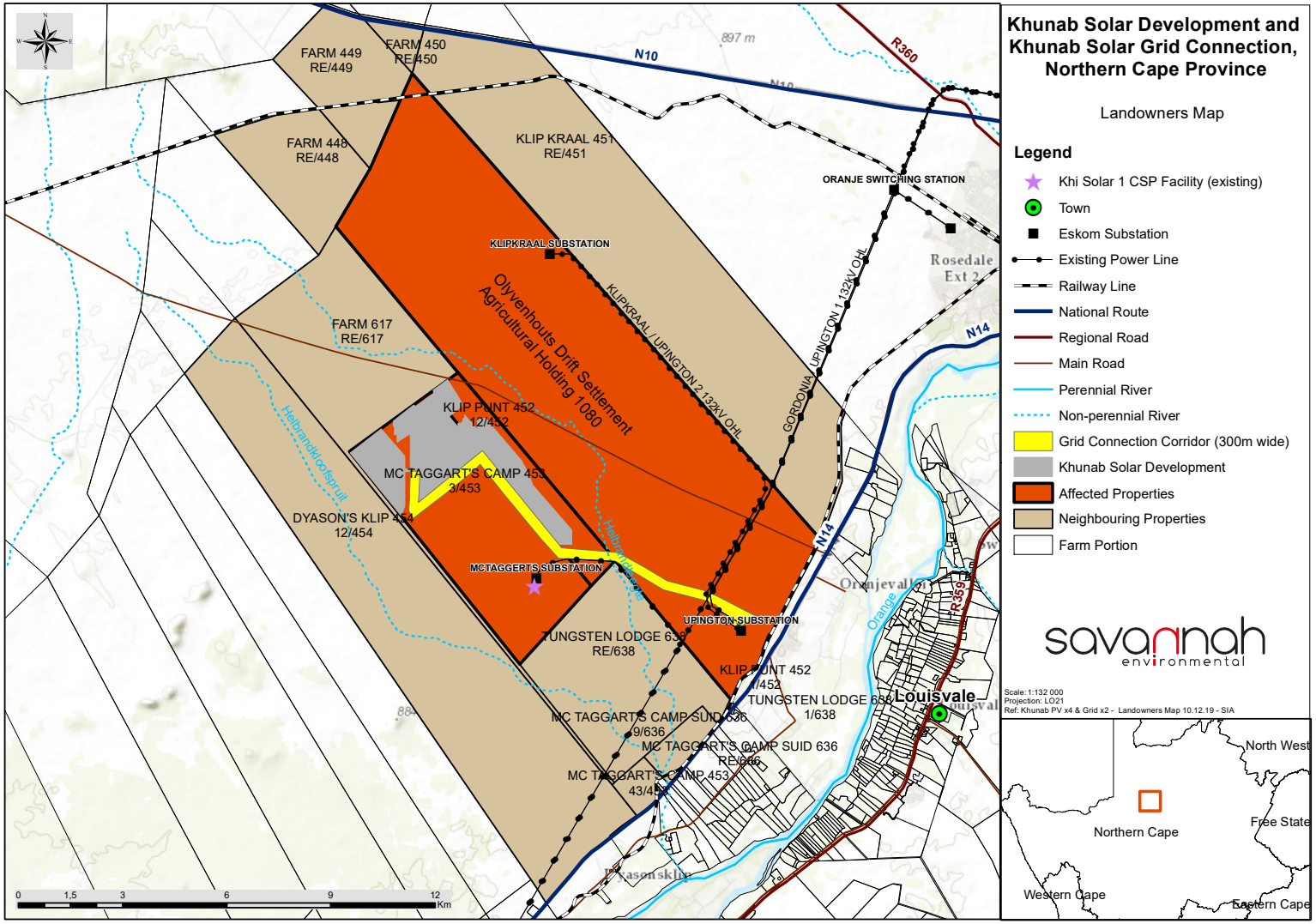

Figure 7.3: Landowners surrounding the Khunab Grid Connection Corridor

The Khunab Solar Grid connection is proposed on Portion 3 of McTaggart's Camp No. 453; Portion 12 of Klip Punt 452; and Olyvenhouts Drift Settlement Agricultural Holding 1080 (also referred to as the broader study area). The broader study area comprises of three agricultural properties which is currently utilised for livestock grazing. The broader study area is located adjacent to the Lutzputs gravel road and the N14 national roads which route along the east and southern boundaries of the broader study area. The N14 national road provides the main access to the area and links Upington with the towns of Kuruman, Kathu, Keimoes, Kakamas, Pofadder, Aggeneys, Springbok and Johannesburg. The N14 further serves as the national route from the west of Johannesburg, past Potchestroom and Vryburg up to Springbok in the Northern Cape Province. Access to the grid connection corridor is provided directly by the Lutzputs gravel road (D3276) which routes from the N14 and runs along the eastern boundary of the broader study area in a north-westerly direction. The closest town to the Khunab Solar Grid Connection broader study area and grid connection corridor is Upington, which is located approximately 18km to the north-east.

Upington and the surrounding areas (i.e. Keimoes, Kakamas etc.), which includes the broader study area and the grid connection corridor, are characterised by some of the highest levels of solar irradiation within the country, therefore making the area an ideal location for solar energy production inclusive of the required associated grid connection infrastructure. In accordance with this, the Upington area (including the broader study area and the grid connection corridor) falls within the Northern Cape Solar Corridor, the Renewable Energy Development Zone (REDZ) (Upington) and the Northern Corridor of the Strategic Transmission Corridors as identified by the DEA (refer to **Figure 7.4**).

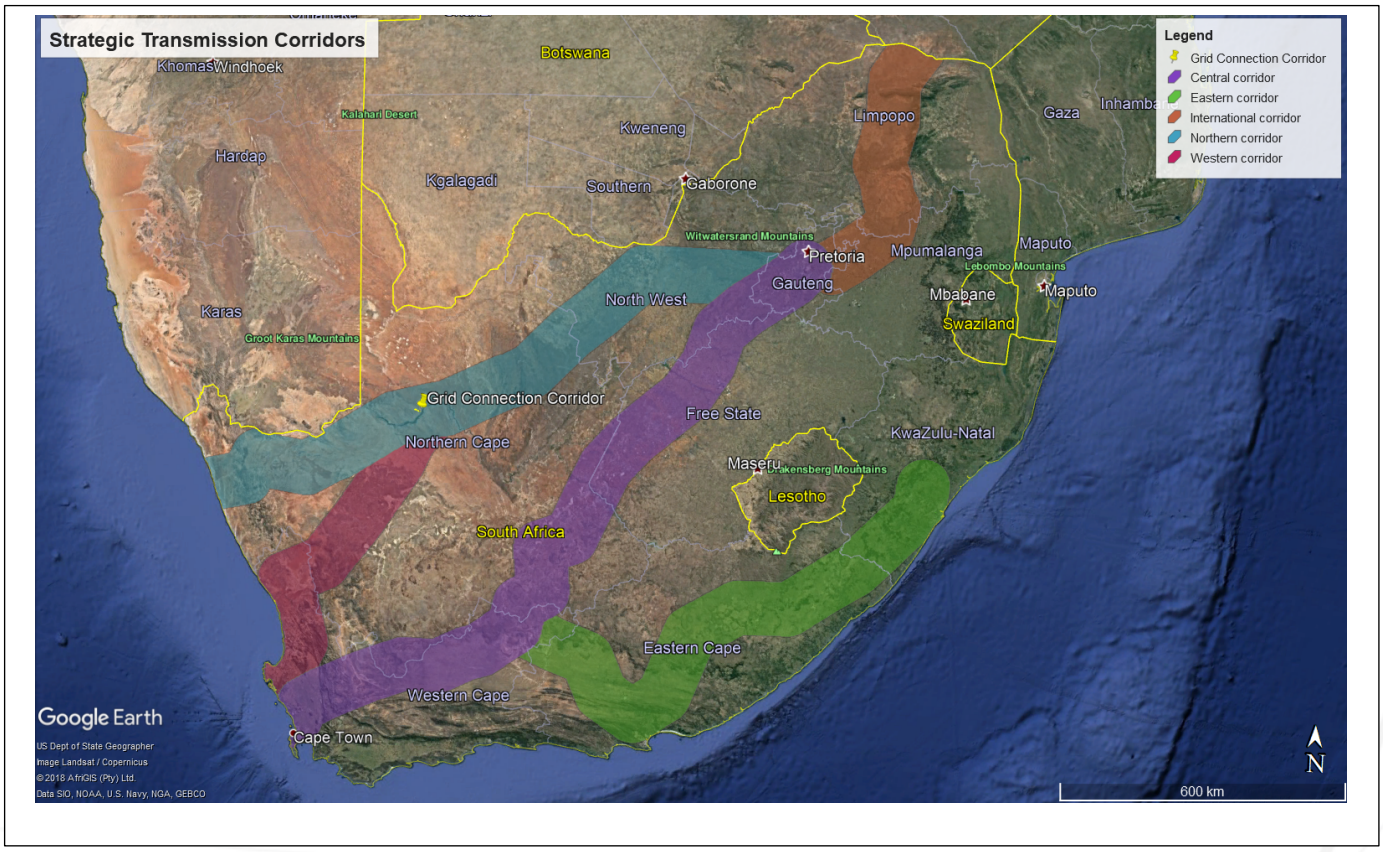

Figure 7.4: Strategic Transmission Corridors identified as the optimal locations where power infrastructure expansion is needed to enable the balancing of future demand and supply requirements, while minimising negative impacts to the environment

1.9 7.4 Climatic Conditions

The Upington area is typically characterised as having a desert climate (BWh / hot desert climate). Very little rainfall occurs during the year, and the area is characterised by an average annual temperature of 19.3°C, and an average annual rainfall of 180mm.

Temperatures range from maximum highs of 34.6°C in January, to minimum lows of 2.5°C in July. January is the warmest month with average temperatures of 26.2°C, and July is the coldest month with average temperatures of 11.5°C. July is also typically the driest month, receiving an average of 2mm of rainfall, while March is the wettest month, receiving an average of 39mm of rainfall (refer to **Figure 7.5** and **Table 7.1**). Rainfall within the area is erratic, both locally and seasonally, and therefore cannot be relied on for agricultural practices. The average evaporation is 2 375mm per year, peaking at 11.2mm per day in December. Frost occurs most years on 6 days on average between mid-June and mid-August.

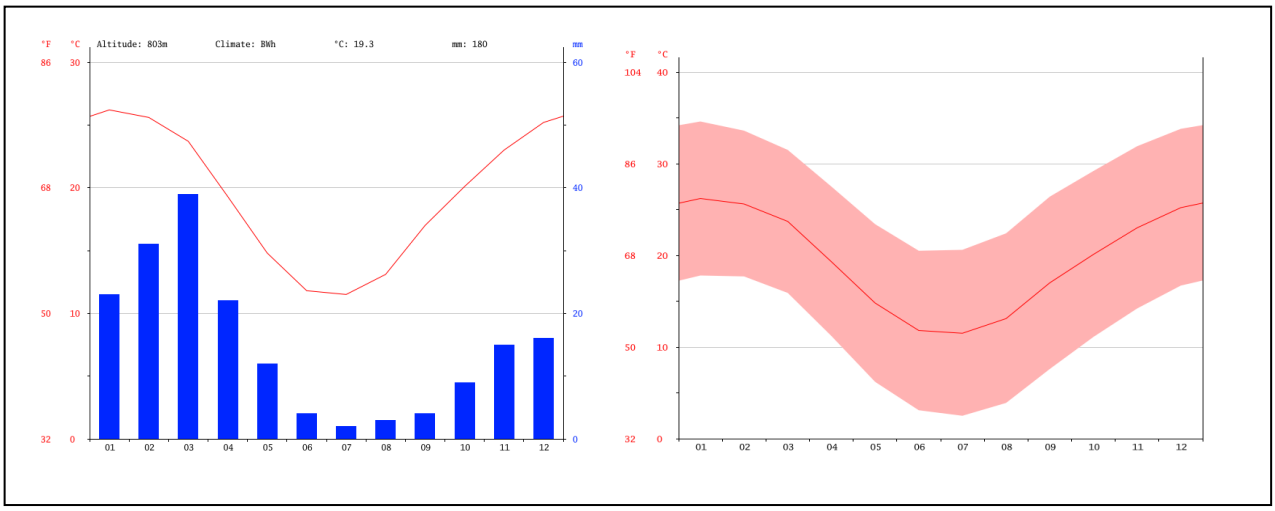

Figure 7.5: Climate and Temperature graphs for Upington, Northern Cape Province (Source: en.climate-data.org).

Table 7.1: Climate data for Upington, Northern Cape Province (Source: en.climate-data.org).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Temp. (˚C)	26.2	25.6	23.7	19.3	14.8	11.8	11.5	13.1	17	20.1	23	25.2
Minimum Temp. (˚C)	17.8	17.7	15.9	11.2	6.2	3.1	2.5	3.9	7.6	11.1	14.2	16.7
Maximum Temp. (˚C)	34.6	33.6	31.5	27.5	23.4	20.5	20.6	22.4	26.4	29.2	31.9	33.8
Precipitation (mm)	23	31	39	22	12	4	2	3	4	9	15	16

7.5. Biophysical Characteristics of the broader study area and grid connection corridor

7.5.1. Topography and Land Use

The natural topography of the grid connection corridor is reasonably flat, but in the north-west a hill dominates the area resulting in an even slope up to the crest. The current land use being undertaken within

the corridor is extensive grazing (specifically sheep grazing) and the corridor is dominated by natural vegetation.

The most prominent water features in the area are the Helbrandleegte River located in the south eastern section of the corridor and the Helbrandkloofspruit located to the south west and outside of the corridor. Amongst the two rivers, there are several dry riverbeds that are present in the grid connection corridor flowing from north to south and from west to east.

7.5.2. Soils, Terrain and Agricultural Potential

The grid connection corridor traverses two land types (refer to **Figure 7.6**). The largest section of the grid connection corridor consists of Land Type Ae10 (both the western and the eastern ends) while the middle of the grid connection corridor is underlain by Land Type Ag1. Each of the land types are described below:

- *Land Type Ag1*- has four different terrain positions and indicates a slightly undulating landscape. The land type is dominated by very shallow soil profiles and includes soil of the Mispah form as well as forms where shallow red apedal or yellow brown apedal soil is underlain either by rock or a carbonate horizon. Soil depths in this land type range between 10 and 45 cm with only Terrain Position 4 having a possibility for deep Hutton soil profiles that range between 60 and 150cm in depth. The underlying geology of Land Type Ag1 is described as granite, migmatite and gneiss of the Namaqualand Metamorphic Complex.
- *Land Type Ae10*- according to the land type data sheet, Land Type Ae10 is underlain by migmatite, gneiss and ultra-metamorphic rocks of the Namaqualand Metamorphic Complex. This land type also has four different terrain positions with the flat plains dominating the landscape and small depressions where water can accumulate in the landscape after rainfall events. The flat plain consists of an equal mixture of shallow Mispah soil as well as shallow red apedal soil profiles underlain by limestone (either soft or hardpan carbonate horizons). The small depression is dominated by the Mispah form interspersed with approximately 10% of Hutton soil profiles. The hilltop and mid-slope terrain positions are dominated by rock interspersed with shallow Mispah profiles.

Six different soil forms are present within the grid connection corridor. These six soil forms have been grouped into three groups (Error! Reference source not found.). Differentiation was made between the deeper Hutton profiles in the south-eastern part of the grid connection corridor assessed for the Khunab Solar Grid Connection and the shallow Hutton profiles observed elsewhere. The very shallow to shallow soil of the Mispah, Glenrosa, Brandvlei and Coega forms have been grouped together since they occur in close proximity to each other over large areas and consist of only an orthic A horizon underlain by a depth-limiting C-horizon. The third group consists of shallow Hutton and Plooysburg forms where a red apedal B1-horizon is present.

The entire extent of the corridor is considered as not being suitable for rainfed crop production, the area has very low to low land capability and is better suited to livestock grazing. While the larger region is known for its high-quality horticultural products, these are only produced where irrigation water and infrastructure is present along the Orange River. No irrigation infrastructure or alternative irrigation water supply is present within the grid connection corridor.

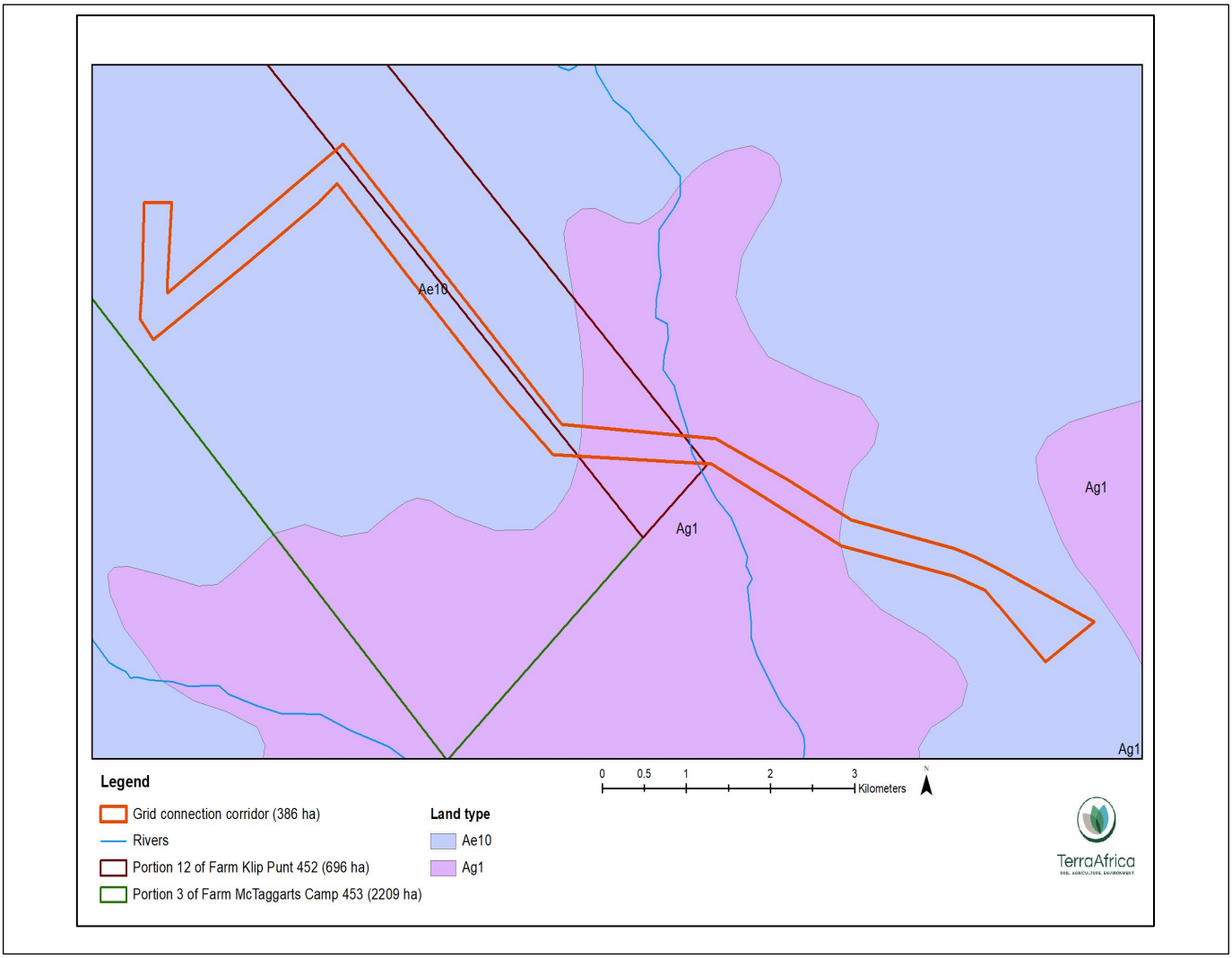

Figure 7.6: Land types present within the grid connection corridor

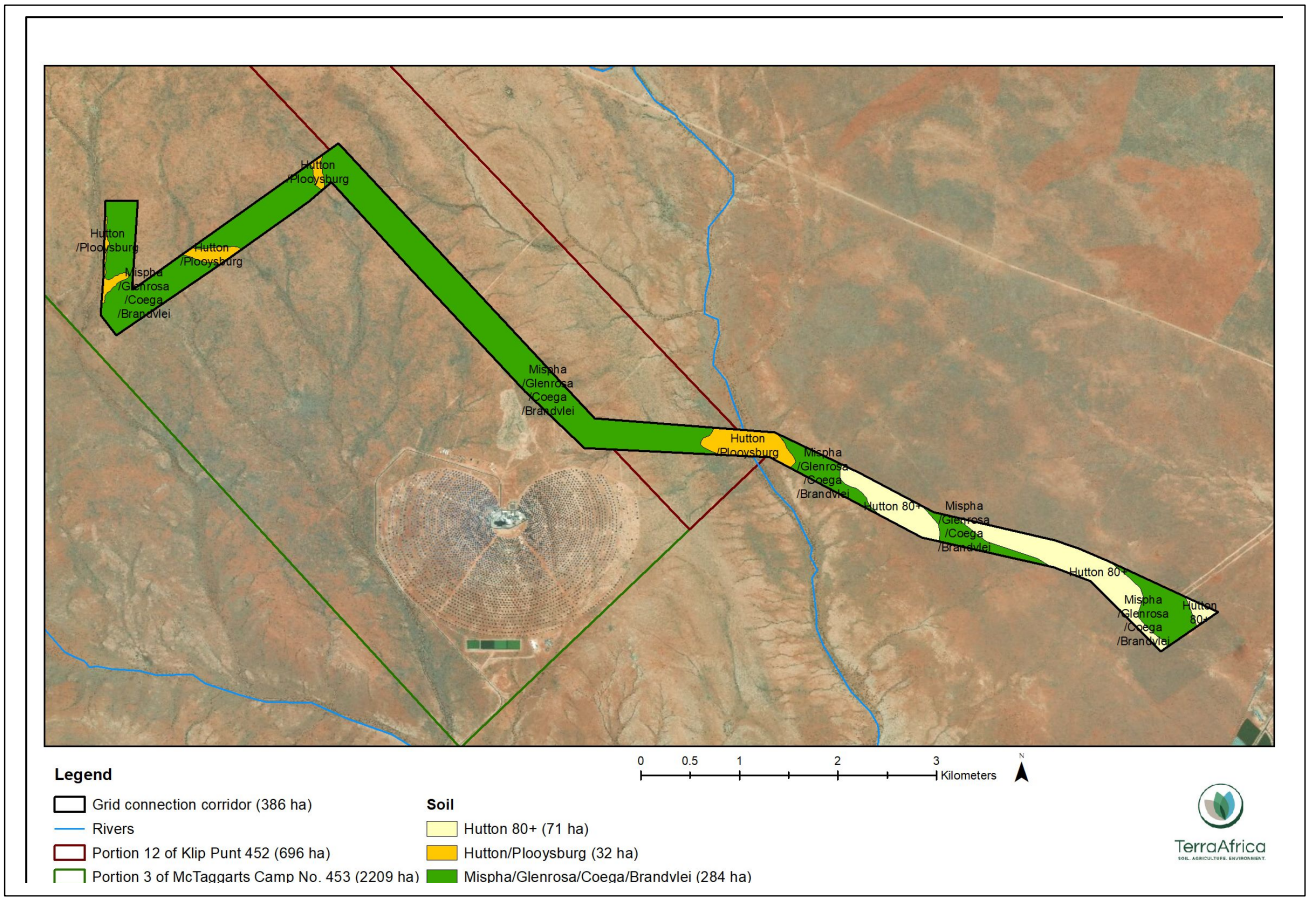

Figure 7.7: Soil types present within the grid connection corridor

7.5.3. Ecological Profile of the Grid Connection Corridor

i. Habitats and vegetation types

According to the national vegetation map, there are two vegetation types within the grid connection corridor, including the Kalahari Karroid Shrubland and a lesser amount of Bushmanland Arid Grassland (**Figure 7.8**).

Both Kalahari Karroid Shrubland and Bushmanland Arid Grassland are classified as Least Threatened and have been little impacted by transformation and more than 99% of their original extent is still intact. Both vegetation types are considered Hardly Protected within formal conservation areas. There are 6 endemic species for Bushmanland Arid Grassland, while no vegetation-type endemic species are known from Kalahari Karroid Shrubland. The biogeographically important and endemic species known from these vegetation types tend to be widespread within the vegetation type itself and local-level impacts are not likely to be of significance for any of these vegetation types or species concerned. Gordonia Duneveld is widely distributed and is among the most extensive vegetation types in South Africa while Kalahari Karroid Shrubland is less extensive, but represents a transitional vegetation type between the northern Nama Karoo and Kalahari (Savannah) vegetation types.

In reality, the vegetation map (**Figure 7.8**) provides a very course representation of the vegetation of the grid connection corridor and surrounding areas. In the broader study area, Kalahari Karroid Shrubland and Bushmanland Arid Grassland form a mosaic across the area reflecting substrate conditions especially soil

depth and texture. Areas of deeper sands are dominated by grasses typical of Bushmanland Arid Grassland while areas of shallow soils with exposed calcrete or quartzite are dominated by shrubby vegetation typical of Kalahari Karroid Shrubland.

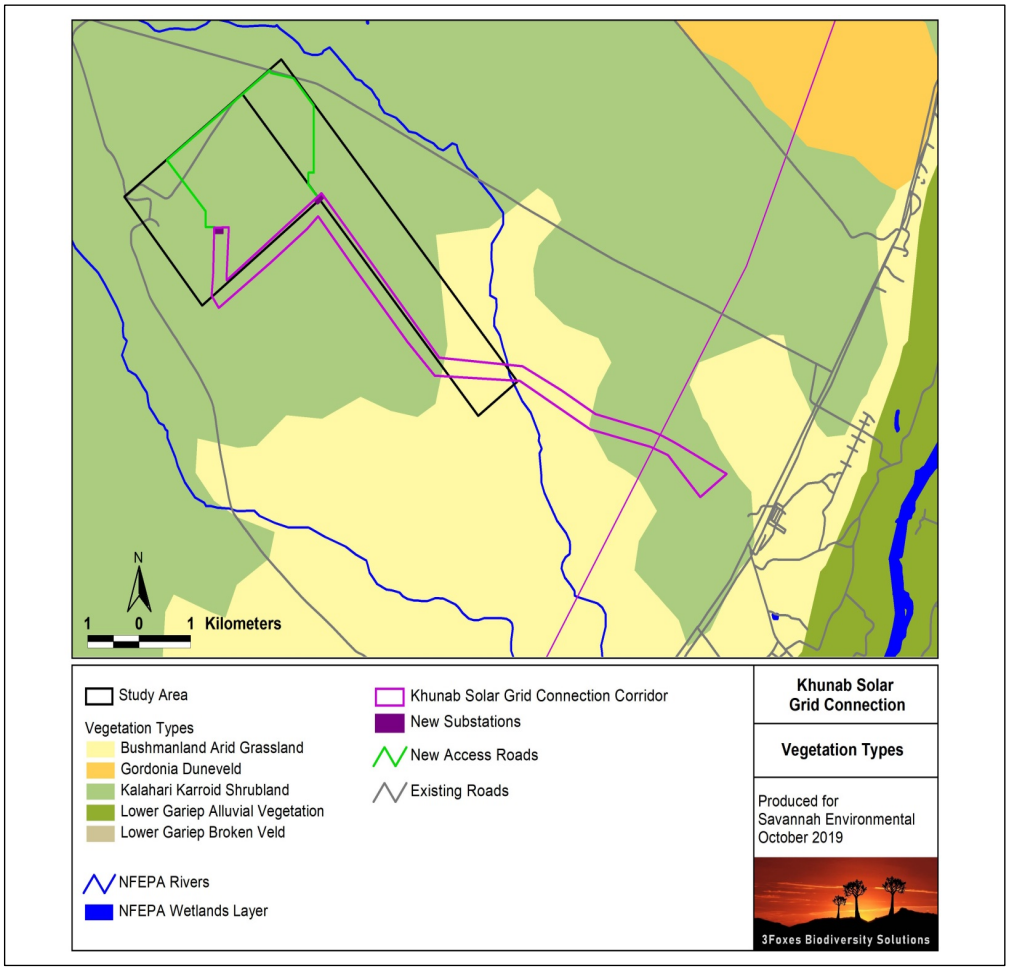

Figure 7.8: Broad-scale overview of the vegetation in and around the Khunab Solar Grid Connection. The vegetation map is an extract of the national vegetation map (and also includes drainage lines delineated by the NFEPA assessment).

Species observed within the areas of Kalahari Karroid Shrubland include shrubs such as *Leucosphaera bainesii*, *Hermannia spinosa*, *Monoechma genistifoilium*, *Salsola rabieana*, *Aptosimum albomarginatum*, *A.spinecens*, *Kleinia longiflora*, *Limeum argute-carinatum*, *Phyllanthus maderaspatensis*, *Zygophyllum dregeanum* and grasses such as *Stipagrostis anomala*, *S.ciliata*, *S.uniplumis*, *S.hochstetteriana* and *Schmidtia kalariensis*. The proportion of shrubs in this vegetation type is usually related to soil depth and texture, with the proportion of grass increasing as the soils become deeper or more sandy. Species of conservation concern that may be present include *Adenium oleifolium*, *Aloe claviflora* and *Hoodia gordonii*, although none of these species were observed within the grid connection corridor.

The vegetation on deeper sands represents Bushmanland Arid Grassland. Common and dominant species include the grasses *Stipagrostis ciliata*, S.obtusa, *S.uniplumis* and *S.amabilis* and shrubs such as *Rhigozum trichotomum*, *Phaeoptilum spinosum*, *Monechma incanum* and *Monechma genistifolium*. Species of conservation concern were not abundant in this habitat. Protected species which occur in this habitat type

include *Boscia foetida* and occasional *Acacia erioloba*. Numbers of these species within the grid connection corridor are however low.

Table 7.2 provides photographs of the vegetation cover present within the grid connection corridor and the surrounding areas.

Table 7.2: Photographs of the vegetation cover present

Photograph	Description
	Vegetation cover of the Khunab Substation (collector substation). The taller vegetation in the foreground is associated with a small wash. The more typical vegetation that would be affected by the construction of the substation is dominated by *Rhigozum trichotomum* with a grass layer of various Stipagrostis species.
	Vegetation cover of the proposed Klip Punt Substation (collector substation). The vegetation is dominated by various shrubs including *Rhigozum trichotomum*, *Phaeoptilum spinosum* and occasional *Boscia foetida* subsp. *foetida*, with a variable density grass layer dominated by various *Stipagrostis* species, mostly *S.ciliata* and *S.uniplumis*.
	View towards the south-east of the proposed grid connection corridor, showing the Kalahari Karroid Shrubland in the foreground and the existing grid line for the Khi Solar CSP plant visible in the distance.
	The major drainage line which traverses the corridor is the Helbrandskloof. As the river can be spanned by the power line. Typical and dominant species include *Zizyphus mucronata*, *Diospyros lycioides*, *Vachellia erioloba*, *Senegalia mellifera*, *Stipagrostis namaquensis* and *Cadaba aphylla*.

View looking back along the proposed grid connection corridor, towards the Khunab Solar Development (i.e. four solar PV facilities) from the Upington MTS. The vegetation is patchy and consists of alternating areas of shrubby vegetation dominated by *Rhigozum trichotomum* and grassy areas dominated by *Stipagrostis* spp.

The current veld condition of the grid connection corridor can be considered to be fair and while there are some areas that have clearly suffered some degradation in the past, the vegetation cover and composition can be considered typical for the broader area. There are some localised areas of *Prosopis* invasion within the grid connection corridor, usually around watering points, but in general there are few alien species present across most of the corridor and surrounding area and it can be considered to be largely intact and in moderate condition.

ii. Listed Plant Species

Two National Forest Act protected tree species occur within the grid connection corridor; *Vachellia* (*Acacia) erioloba* and *Boscia albitrunca*. Both of these species are associated largely with drainage lines. The provincially protected *Boscia foetida* subsp. *foetida* is also confirmed present and is fairly widespread across the area at a moderate density. It is however common in the Upington area and the density within the broader study area is not exceptional. Although there are often quartz patches in the area which are home to several local endemics or specialised species, no significant quartz patches home to such species were observed within the grid connection corridor.

iii. Critical Biodiversity Areas (CBA) and Broad-Scale Processes

An extract of the Northern Cape Critical Biodiversity Areas map for the broader study area and grid connection corridor is depicted below in **Figure 7.9**. The majority of the corridor lies within an area classified as "Other natural areas" and has not been classified as a Critical Biodiversity Area (CBA) or an Ecological Support Area (ESA). The Helbrandleegte is classified as an ESA but is not very wide and it can easily be spanned by the power line with the result that there would not need to be any pylons in the riverbeds. The only area classified as CBA is the area around the Upington MTS, which is classified as CBA2. The footprint of the grid connection corridor in this area would be minor and would not create significant habitat loss within the CBA and would not compromise the ecological functioning of the CBA.

Furthermore, the grid connection corridor does not lie within an area identified as a priority area for future conservation expansion under the Northern Cape PAES (Protected Areas Expansion Strategy).

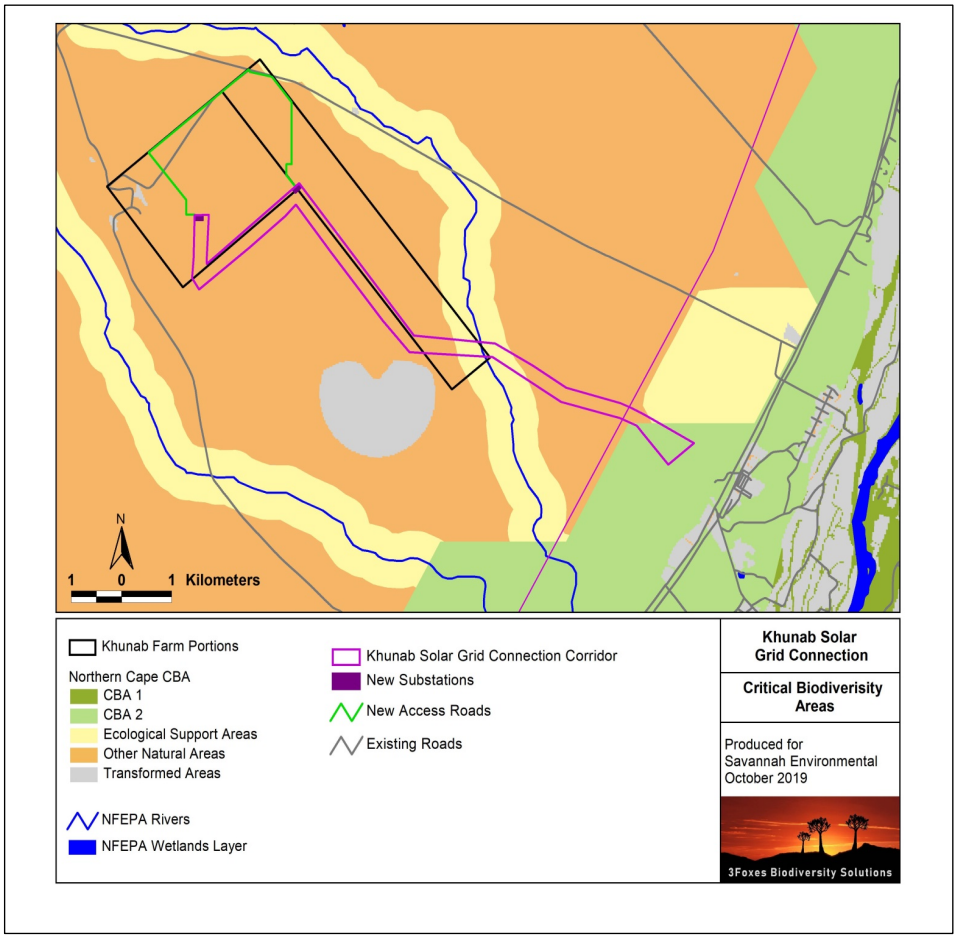

Figure 7.9: Extract of the Northern Cape Critical Biodiversity Areas map for the broader study area and the grid connection corridor, showing that it is only the area around the existing Upington MTS that is located in a CBA2 and the rest of the corridor would not impact any other CBAs.

iv. Terrestrial Fauna

Mammals

The broader study area, including the grid connection corridor, falls within the distribution range of 46 terrestrial mammals, indicating that the mammalian diversity of the area is of moderate potential. The variety of habitats present is however fairly low, and the overall mammalian diversity of the corridor is likely to be lower than the richness of the broader study area. The lack of rocky hills or outcrops within the grid connection corridor would preclude a variety of species from the affected area. Mammal species that can be confirmed based on observations or are known from adjacent sites in the immediate area include Black-backed Jackal, African Wildcat, Cape Fox, South African Ground Squirrel, Springhare, Steenbok, Duiker, Springbok, Gemsbok, Cape Porcupine, Yellow Mongoose, Slender Mongoose, Cape Hare and Aardvark. Species such as Cape Clawless Otter and Water Mongoose may also occasionally be present in the rainy season when they apparently make forays from the Orange River to visit some of the larger pans of the area. For such species, the drainage lines represent important movement corridors.

Two listed terrestrial mammals may occur, the Brown Hyaena *Hyaena brunnea* (Near Threatened) and Black-footed cat *Felis nigripes* (Vulnerable). While it is possible that both species may occur, within the grid connection corridor it is least likely that the Brown Hyaena *Hyaena brunnea* may be more present as this

species is often purposely or inadvertently persecuted within farming areas. These two species have a wide national distribution.

Reptiles

According to the SARCA database, 39 reptile species are known to be present within the broader study area suggesting that the reptile diversity within the grid connection corridor is likely to be moderate to low. As there are no significant rocky outcrops present within the grid connection corridor, only species associated with sandy substrates or trees are likely to be present. Species observed within the corridor or in the vicinity include the Namaqua Mountain Gecko *Pachydactylus montanus*, Ground Agama *Agama aculeata aculeata*, Spotted Sand Lizard *Pedioplanis lineoocellata* and the Spotted Desert Lizard *Meroles suborbitalis*. No reptile species of conservation concern are known from the area and there do not appear to be any broad habitats in the corridor which would be of high significance for reptiles. There are no listed or range-restricted reptiles that are likely to occur within the grid connection corridor.

Amphibians

The broader study area, including the grid connection corridor, lies within the distribution range of 10 amphibian species. The only listed species which may occur is the Giant Bullfrog *Pyxicephalus adspersus* which is listed as Near Threatened. No suitable breeding sites were observed in or near the grid connection corridor and it is not likely that this species is present. As there are no natural perennial water sources within the grid connection corridor, it is likely that amphibian abundance is generally low and restricted largely to those species that are relatively independent of water such as the Karoo Toad *Vandijkophrynus gariepensis*. The abundance of amphibians within the area is low.

v. Avifauna

Avian Microhabitats

Three main avifaunal microhabitats can be distinguished, namely the plains associated with the Kalahari Karroid Shrubland, small drainage lines and small pans scattered throughout the broader study area. The plains are the dominant habitat type constituting a mix of grasses and shrubs in varying proportions, while the drainage lines and pans support a denser woody habitat.

General Avifauna

An approximate total of 150 bird species are known to occur within the grid connection corridor and broader study area, of which 68 species were recorded on site during the two field surveys. Eight (8) of these species are listed as threatened, and another four (4) are considered Near-Threatened. Seven species are considered true near-endemics to South Africa, while twelve (12) are considered biome-restricted. The bird assemblage recorded within the grid connection corridor is fairly typical of the Kalahari bioregion, with elements of the Nama-Karoo.

Species with relatively high abundance which also exhibited the most stable trends between the two seasons include Spike-heeled Lark *Chersomanes albofasciata*, Sabota Lark *Calendulauda sabota* and Chat Flycatcher *Bradornis infuscatus*. Less abundant species with stable trends include Yellow Canary *Crithagra flaviventris*, Southern Fiscal *Lanius collaris*, Bokmakierie *Telophorus zeylonus* and Dusky Sunbird *Cinnyris fuscus*.

Primarily resident species which showed surprisingly highly variable detections between the seasons include Eastern Clapper Lark *Mirafra fasciolata*, Rufous-eared Warbler *Malcorus pectoralis*, Fawn-coloured Lark *Calendulauda africanoides*, and Black-chested Prinia *Prinia flavicans*. The most common non-passerine, the Northern Black Korhaan *Afrotis afraoides,* also exhibited variable detections between the seasons. These differences in detections of these species are mostly likely due to reduced vocalisations in late summer, compared to spring when most species begin to breed. Highly nomadic species which showed dramatic fluctuations between the seasons include Lark-like Bunting *Emberiza impetuani*, which was only abundant in spring, and the biome-restricted Stark's Lark *Spizocorys starki*, which was only present in good numbers in late summer.

Collision-prone and red-listed species

Red-listed species are considered fundamental to this study, because of their susceptibility to power lines and associated infrastructures. Five (5) of the eight (8) threatened species known from the broader study area were recorded during the field surveys, and a further two (2) of the four (4) Near-Threatened species (**Table 7.3**). One species (Tawny Eagle *Aquila rapax*) has not been recorded in the area during SABAP surveys but is known to occur on occasion based on local knowledge.

The most important of the red-listed species is the Critically Endangered White-backed Vulture Gyps africanus, which was recorded on two separate days during the late summer site visit. At least two immature birds were seen on each occasion, soaring at varying heights across the grid connection corridor, presumably searching for food. The broader study area is currently being used for grazing, and hence vultures may occasionally pass by during foraging forays. There are no breeding or roosting sites nearby, primarily due to the absence of suitably large *Acacia erioloba* trees, and hence the species is considered only as an occasional visitor, corroborated by its infrequent presence in the area based on SABAP records.

Similarly, the Endangered Lappet-faced Vulture *Torgos tracheliotos,* which was seen on one occasion (one individual) together with two White-backed Vultures, is most likely also only an occasional visitor to the area. The Martial Eagle *Polemaetus bellicosus* (Endangered) is also an important species, as two individuals were recorded on separate occasions in close proximity to the broader study area, one adult and one immature bird, both perched on utility poles. The species most likely breeds on a large pylon in the broader area and is therefore likely a resident. However, there are no suitable pylons or trees for nesting within the broader study area itself.

Although not recorded during SABAP2, the nomadic Ludwig's Bustard has been recorded by local knowledge, and one sighting was made during the late summer survey, suggesting the species does occur during favourable conditions. However, this species displays nomadic behaviour. The Tawny Eagle (Endangered) is only known from the area based on local knowledge, but probably only occurs on rare occasions as this species favours more wooded savannas and can therefore be considered to be rare to uncommon visitor.

The two Near-Threatened species that were recorded during the field surveys include Karoo Korhaan (several sightings) and Kori Bustard (3 sightings, 5 individuals). The Karoo Korhaan were recorded along the eastern boundary of the broader study area were gravel plains predominate, their preferred habitat. The Kori Bustard were recorded both within the grid connection corridor and beyond the boundaries of the broader study area.

Both Secretary bird *Sagittarius serpentarius* (Vulnerable) and Lanner Falcon *Falco biarmicus* (Vulnerable) have a relatively moderate SABAP2 reporting rate of 22% and are therefore very likely to occur in the area fairly frequently. One Lanner Falcon was seen perched on a pylon a few kilometres south of the broader study area, so may occasionally frequent the grid connect corridor during hunting forays. A pair of Secretarybird previously nested in the vicinity of the broader study area near the existing Khi Solar One CSP facility prior to its construction, but no sightings were made during the site visits. All other red-listed species have rather low SABAP2 reporting rates (<5%) for the area, and include Black Stork *Ciconia nigra* (Vulnerable), Pallid Harrier *Circus macrourus* (Near-Threatened), and Abdim's Stork *Ciconia abdimii* (Near-Threatened). The local populations of these species are, however, mostly of low to moderate importance, as these species appear to be only very occasional visitors based on their low reporting rates. The project site and surrounds do not provide essential breeding or feeding habitat to these species. The stork species, in particular, would most likely be found near frequently more suitable habitats closer to the Orange River.

During the walking transects, regular scans were made to detect any large flying birds to establish the presence of flight paths across the broader study area. Besides the two sightings of vultures made during these scans, the additional 12 hours of observations from the vantage point revealed only one Pale Chanting Goshawk *Melierax canorus* in flight over the area. This bird was seen soaring at a low to moderate height (<200 m), for a period of a few minutes. Besides the predominantly terrestrial Karoo Korhaan and Kori Bustard, no other red-list species were seen using the site or flying routine flight paths. This may be due to the apparent absence of communal roosting and breeding sites, and hence birds may be traversing the site on an *ad hoc* basis. Besides the absence of communal nest sites, no individual nests were located during the field survey. However, it may be possible that species such as Secretary bird may use solitary *Boscia* or other tree species for nesting.

In essence, much of the avifauna of the broader study area appears fairly similar to that found across the Kalahari and Nama-Karoo bioregions of the Northern Cape. Although a relatively high proportion of near-endemic and biome-restricted species occur many of these have wide ranges or are highly nomadic within the bioregion. Species which clearly use the broader study area as part of their foraging ranges include White-backed Vulture, Lappet-faced Vulture, Martial Eagle, Tawny Eagle, Lanner Falcon, and Secretarybird.

Table 7.3: Red-listed species recorded in the broader study area during SABAP1 (1987-1991), SABAP2 (2007 on-going) and the spring (4 to 8 October 2018) and late summer (9 to 12 April 2019) site visit, ranked according to their red-list status. All species besides White-backed Vulture, Ludwig's Bustard and Tawny Eagle have been recorded during the SABAP2 period. Seven species were observed during the two site visits (marked in bold).

English name	Taxonomic name	Red-list status	Estimated importance of local population	Preferred habitat	Probability of occurrence	Threats
Vulture, White-backed	***Gyps africanus***	**Critically Endangered**	**Low**	**Savanna**	**Recorded**	**Habitat loss/Disturbance Collisions/Electrocution**
Vulture, Lappet-faced	***Torgos tracheliotos***	**Endangered**	**Low**	**Savanna**	**Recorded**	**Habitat loss/Disturbance Collisions/Electrocution**
Bustard, Ludwig's	***Neotis ludwigii***	**Endangered**	**Moderate**	**Shrubland plains**	**Recorded**	**Habitat loss/Disturbance Collisions**
Eagle, Martial	***Polemaetus bellicosus***	**Endangered**	**Moderate**	**Savanna & shrublands**	**Recorded**	**Habitat loss/Disturbance Collisions/Electrocution**
Eagle, Tawny	*Aquila rapax*	Endangered	Low	Savanna & Karoo plains	High	Habitat loss/Disturbance Collisions/Electrocution

Falcon, Lanner	***Falco biarmicus***	**Vulnerable**	**Moderate**	**Widespread**	**Recorded**	**Habitat loss/Disturbance Collisions/Electrocution**
Secretarybird	*Sagittarius serpentarius*	Vulnerable	Moderate	Open savanna & grassland	High	Habitat loss/Disturbance Collisions
Stork, Black	*Ciconia nigra*	Vulnerable	Low	Water bodies	Low	Collisions
Bustard, Kori	***Ardeotis kori***	**Near-Threatened**	**Moderate**	**Open savanna**	**Recorded**	**Habitat loss/Disturbance Collisions**
Harrier, Pallid	Circus macrourus	Near-Threatened	Low	Grassland & floodplains	Low	Habitat loss/Disturbance/Collisions
Korhaan, Karoo	***Eupodotis vigorsii***	**Near-Threatened**	**Moderate**	**Shrubland plains**	**Recorded**	**Habitat loss/Disturbance Collisions**
Stork, Abdim's	*Ciconia abdimii*	Near-threatened	Low	Grassland & savanna	Low	Collisions

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

7.6.1 Heritage and the cultural landscape

The cultural landscape consists of two components. The first is a rural area in which the human occupation is made up of a pre-colonial (stone age) component and a later colonial (farmer) component. This rural landscape has always been sparsely populated. The second component is an urban one, consisting of a number of smaller towns, most of which developed during the last 150 years or less.

This area also is very rocky. The stones here are dark in colour and may be of a basaltic origin. However, in the flat areas adjacent to the hill the rocks are white coloured and most likely soft calcrete, which would not have been suitable for the manufacturing of stone tools. Due to the landscape's topography the grid connection infrastructure will be prominent in the landscape and alter the rural appearance.

No significant heritage resources were identified within the grid connection corridor for the Khunab Solar Grid Connection (**Figure 7.10**)

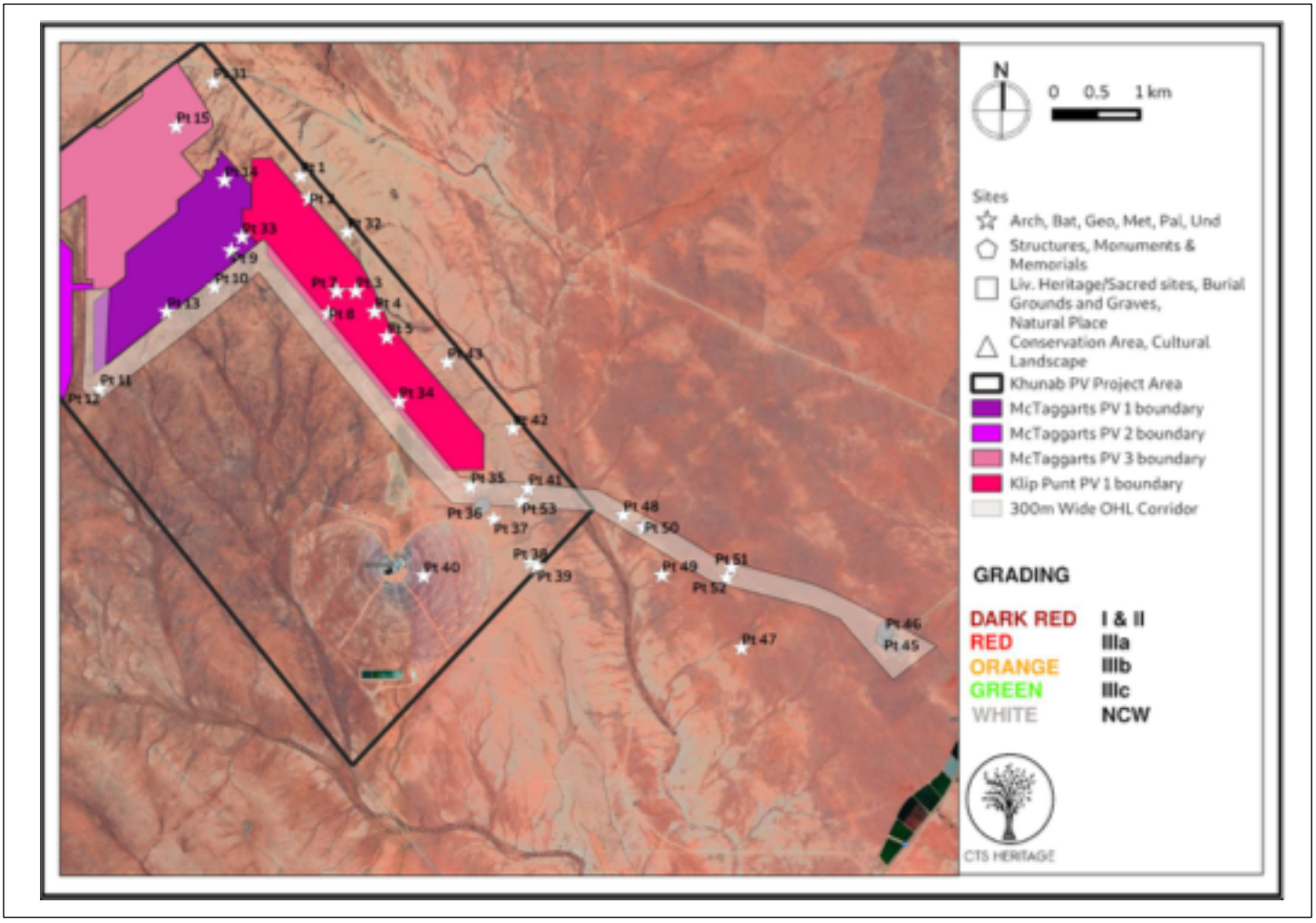

Figure 7.10: Heritage resources in the vicinity of and within the grid connection corridor

7.6.2. Archaeology

The area surrounding Upington has a rich historical and archaeological past. Most of the heritage resources identified are Stone Age artefact scatters of varying significance. Numerous areas where low density scatters of Middle and Later Stone Age lithics were found. In addition, one possible herder site was identified during a survey. No other material or deposits were identified but that does not exclude the possibility of subsurface material.

Five sites of moderate local significance are located just beyond the border of the proposed grid connection corridor. This includes a site consisting of ostrich eggshell fragments and stone flakes scattered around the base of a hill in low densities. Flakes are micro lithic supporting an ascription to the Late Stone Age (LSA) utilising quartzite as raw material. A lead sealed bully beef can was also found here dated to the late 1800's or early 1900's. Middle Stone Age (MSA) artefact scatter sites were also found. In addition, there is a historical structure located within the grid connection corridor of unknown heritage significance.

Stone Age and historical archaeological resources were identified within the grid connection corridor, however these are considered to be not conservation worthy as they are widely scattered and have no associated contextual material. The area assessed is by no means pristine as an existing overhead power line runs south of the grid connection corridor in the south-south-east from east to west.

No formal or informal graves were identified within the grid connection corridor.

7.6.3. Palaeontology

According to the SAHRIS Palaeosensitivity Map, this area (including the grid connection corridor) is underlain by the Gordonia Formation (Quaternary coversands of moderate palaeontological sensitivity), the Bethesda Formation, the Jannelsepan Formation, the Keimoes Formation and the Straussburg Granite, of zero palaeontological sensitivity.

The Gordonia Formation rests on calcretes or directly on pre-Kalahari bedrock. The sands can be up to 30m thick and frequently are linear dunes that have been stabilised by vegetation (ibid). In areas to the south there is evidence of palaeo-rivers, for example the Koa Valley where the so-called Kalahari River flowed during wetter Cenozoic times before continental uplift occurred together with global aridity. After the mid Miocene pluvial phases, the Koa River was captured by the Orange River and only palaeochannels remain. Some palaeochannels contain gravel clasts, diamonds, silicified wood and vertebrate bones.

Some Quaternary pans have fossil fauna and artefacts preserved within them, such as Kath Pan and Townlands near Kuruman but no pans are visible.

7.7. Visual Quality

The broader study area for the grid connection is generally flat, consisting of valley depressions that are obvious along the N14 national road towards Keimoes. Numerous renewable energy developments have been developed and proposed within the vicinity of the broader study area, i.e. the Khi Solar One CSP facility and Sirius Solar PV One, etc.

Three (3) sensitive visual receptors have been identified for the development of the grid connection corridor, landscape which due to the use could be sensitive to landscape change. The low number of the receptors is a result of the development being viewed in the context of the existing grid connection corridors within the vicinity of the broader study area, which include, the Khi Solar One grid connection and Sirius Solar PV One grid connection which is currently under construction.

Area Receptors

» Area Receptors include the minor urban settlement areas, that are located within the Orange River Corridor LCA. From the site visit it appears that the majority of settlement areas relate to agricultural use of the Orange River Valley. It is likely that the residents of these minor settlements are predominantly focused on agricultural production of the area. As these settlements are located within the River Valley LCA, it is likely that views of the proposed development particularly from the northern side of the valley will be difficult. It is also likely that vegetation within the River Valley will help screen views of the proposed development that may be possible from the valley;

Linear Receptors

» Linear Receptors or routes through the area include the N14, the R359, the Lutzputs Road and the Upington to Kakamas Spur Railway Line. Both the N14 and the R359 roads have tourism significance, although the N14 is possibly the most important in this regard. The Lutzputs Road is an un-surfaced road that at its closest runs approximately 2.4km to the north of the grid connection corridor, this road is likely

to be mainly used by local people. The Upington to Kakamas Spur Railway Line is used for transporting goods and so is not considered further;

Point Receptors

» Point Receptors include individual homesteads that are located both within the River Valley LCA and the Plateau LCA. From the site visit, it is unlikely that settlements on the northern side of the Orange River will have views over the grid connection corridor and associated infrastructure. It is possible that settlements on the higher sections on the southern side of the valley could have views of the corridor. These however will be distance views and they are likely to be softened / screened by vegetation on the fringes of the Orange River Valley.

Figure 7.16: View from the N14 approximately 8.5km to the south-east of the grid connection corridor looking along the road.

The gently undulating nature of the landform on the edge of the Orange River Valley is clear from the road profile. When in one of the valleys, visibility over the surrounding landscape is restricted.

Figure 7.17: View from close to the N14 looking down into the Orange River Valley.

The shallow valley sides slope gently down to the river.

The Orange River has, to a large degree, dictated the settlement pattern in this arid region by providing a source of perennial water for the cultivation of grapes and cotton. This and the associated production of wine and dried fruit (raisins and sultanas) are the primary agricultural activity of this district. The majority of cultivation and settlement in the region occurs around the Orange River. Upington is a major regional centre that lies approximately 10km to the north-east of the grid connection corridor. Due to distance and the relatively flat terrain, it is highly unlikely that the proposed project will have any visual impact on this area. In the vicinity of the corridor there are extensive vineyards within the Orange River Valley.

Settlement in the form of small townships and groups of farm buildings are located on the edges of the Orange River Valley and within the cultivated areas. This cultivation and settlement generally extend to the N14 which runs along the upper edge of the River Valley. Because the majority of settlement is within the River Valley and at a lower level than the grid connection corridor, it is likely that the proposed development will be largely screened, particularly from settlements located on the northern side of the Orange River. Other than areas located around the Orange River, settlement in the region is sparse.

Only one tourism land use was obvious, this was the Bezalel Wine Farm, the entrance to which is located on the N14 approximately 13km to the south of grid connection corridor. The farm itself including accommodation, a restaurant and a wine tasting area is located within the valley. Views of the Khunab Solar Grid connection will not be possible from this operation.

Figure 7.18: View of the Bezalel Wine Farm within the Orange River Valley

Figure 7.19: View of Khi Solar One from the Lutzputs Road to the north-east

Figure 7.20: View of Sirius Solar PV One project under construction (centre picture) from the Lutzputs Road.

7.7.1 Vegetation Patterns

The following vegetation types are evident within the grid connection corridor;

a) Natural vegetation that is generally associated with the rural landscape; and
b) Vegetation within the Orange River Valley that is generally associated with agricultural operations.

»

a) Natural Vegetation

The natural vegetation of the area includes:

- Bushmanland Arid Grassland;
- Kalahari Karroid Shrubland; and
- Gordonia Dunveld.

»

Bushmanland Arid Grassland includes;

Extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses (Stipagrostis species) giving this vegetation type the character of semidesert 'steppe'. In places low shrubs of Salsola change the vegetation structure. In years of abundant rainfall rich displays of annual herbs can be expected.

Kalahari Karroid Shrubland includes;

Low karroid shrubland on flat, gravel plains. Karoo-related elements (shrubs) meet here with northern floristic elements, indicating a transition to the Kalahari region and sandy soils.

Gordonia Dunveld includes;

Parallel dunes about 3–8 m above the plains. Open shrubland with ridges of grassland dominated by Stipagrostis amabilis on the dune crests and Acacia haematoxylon on the dune slopes, also with A. mellifera on lower slopes and Rhigozum trichotomum in the interdune straaten.

Whilst botanically these vegetation types may be very different, in visual terms the most important characteristics include:

- They are key components of the natural, semi-desert, landscape of the region;
- The description of Gordonia Duneveld picks up on the regular, wave like, dunes that are a dominant feature of the landscape surrounding Upington; and
- All the descriptions highlight the fact that vegetation in the area is low and provides little screening potential for development.

»

b) Vegetation within the Orange River Valley

Vegetation within this area is comprised of a matrix of:

- Crop vegetation that is largely comprised of grapes for wine making and fruit;
- Patches of low natural vegetation particularly on the upper valley slopes;
- Ornamental vegetation including large trees around homesteads and small settlements; and
- Patches of mainly alien vegetation particularly on the edges of cultivation.

7.8 Social Context

The social context provides an indication of the specific social aspects within the area which will be relevant to the development of the Khunab Solar Grid Conection, and which may be affected with the development of the proposed project.

There are no major social receptors located within or directly adjacent to the grid connection corridor. Social receptors which could be affected are the local travellers making use of the Lutzputs Road (D3276) located to the north-east of the corridor. Other social receptors located further to the south-east include travellers making use of the N14, the settlements of Klippunt, Ses Brugge, Kalksloot, Oranjevallei and Dyasons Klip, as well as the agricultural activities undertaken along the Orange River. Due to the fact that the development of grid infrastructure and other renewable energy developments has already been undertaken within the surrounding area of the social features, i.e. the construction and operation of the Khi Solar One CSP Facility, the construction of the Sirius Solar One PV project, the construction of the Dyasons Klip 1 and 2 PV projects and the construction and operation of the Oasis Oranje 132kV power line and Upington MTS, the development of the proposed project will not introduce industrial and grid related infrastructure as a land use to the area. The nature and extent of the development and the distance of the corridor to these social receptors also provides some buffer in terms of direct impact.

Table 7.4 provides a baseline summary of the socio-economic profile of the Kai !Garib LM and the Dawid Kruiper LM within which the Khunab Solar Grid Connection is located. In order to provide context against which the LM's socio-economic profile can be compared, the socio-economic profiles of the ZF Mgcawu DM, Northern Cape Province, and South Africa as a whole have also been provided. The data presented in this section have been derived from the 2011 Census, the Local Government Handbook South Africa 2019,

the Northern Cape Provincial Spatial Development Framework (PSDF), and the ZF Mgcawu DM and Kai !Garib LM IDPs.[27]

Table 7.4: Baseline description of the socio-economic characteristics of the area within which the Khunab Grid Connection is proposed

Location characteristics
» The project is proposed within the Northern Cape Province, which is South Africa's largest, but least populated Province. » The project is proposed within the Kai !Garib LM and the Dawid Kruiper LM of the ZF Mgcawu DM. » The Dawid Kruiper LM was established by the amalgamation of the Mier LM and //Khara Hais LM on 3 August 2016 and covers an area of land 44 231km² in extent, formally making it the largest LM in South Africa. » The Kai !Garib LM is approximately 26 358km² in extent, equivalent to approximately one quarter (25.7%) of the ZF Mgcawu DM.
Population characteristics
» Between 2001 and 2011 the Kai !Garib LM experienced a population growth rate of 1.2% per year. » Between 2001 and 2011 the Dawid Kruiper LM experienced a population growth rate of 1.8% per year. » The Kai !Garib LM is male dominated, with males comprising approximately 52.0% of the LM population. The ZF Mgcawu DM is also male dominated, with males comprising approximately 50.8% of the DM population. » The Dawid Kruiper LM is female dominated, with females comprising approximately 50.6% of the LM population, while the ZF Mgcawu DM is male dominated, with males comprising approximately 50.8% of the DM population. » Coloureds comprise the predominant population group within the Kai !Garib LM, Dawid Kruiper LM and ZF Mgcawu DM. » The Kai !Garib LM, Dawid Kruiper LM, ZF Mgcawu DM, and Northern Cape provincial, and South African national population age structures are all youth dominated. A considerable proportion of the respective populations therefore comprise individuals within the economically active population between the ages of 15 and 64 years of age
Economic, education and household characteristics
» The Kai !Garib LM has a dependency ratio of 29.5, which is lower than the ZF Mgcawu DM (33.6), Northern Cape Province (35.8), and South Africa (34.5). » The Dawid Kruiper LM has a dependency ratio of 35.6, which correlates closely with the ZF Mgcawu DM (34.4), Northern Cape Province (35.8), and South Africa (34.5). » Education levels within the Kai !Garib LM are low with approximately 70.6% of the population aged 20 years and older who have received some form of schooling not having completed Grade 12 / Matric. This implies that the majority of the population can be expected to have a relatively low-skill level and would either require employment in low-skill sectors, or skills development opportunities in order to improve the skills level of the area. » Education levels within the Dawid Kruiper LM are low with approximately 58.3% of the population over 20 years of age not having completed Grade 12 / Matric. This means that the majority of the population can be expected to have a relatively low-skill level and would either require employment in low-skill sectors, or skills development opportunities in order to improve the skills level of the area.

[27] While information was derived from the Local Government Handbook South Africa 2019, Northern Cape PSDF, ZF Mgcawu DM and Kai !Garib LM and Dawid Kruiper LM IDPs, these sources largely make use of statistical information derived from the Census 2011. The information presented in this Chapter may therefore be somewhat outdated, but is considered sufficient for the purposes of this assessment (i.e. to provide an overview of the socio-economic characteristics against which impacts can be identified and their significance assessed).

- The unemployment rate of the Kai !Garib LM (6.7%) is lower than that of the ZF Mgcawu DM (11.3%), and the percentage of economically inactive individuals within the Kai !Garib LM (31.3%) is also lower than that of the ZF Mgcawu DM (38.3%).
- The unemployment rate of the Dawid Kruiper LM is only fractionally lower than that of the ZF Mgcawu DM (i.e. 11.9% for the LM and 11.3% for the DM), and the percentage of economically inactive individuals within the Dawid Kruiper LM is higher than in the ZF Mgcawu DM (i.e. 43.3% in the LM and 38.3% in the DM). This could have a negative impact in terms of the local human capital available for employment.
- Household income levels within the Kai !Garib LM are very low, with approximately 84% falling within the poverty level (i.e. R0 – R38 400 per annum). The area can therefore be expected to have a high poverty level with associated social consequences such as not being able to pay for basic needs and services and poor living conditions.
- Household income levels of the Dawid Kruiper LM are low within the area, with over half (54%) of falling within the poverty level (i.e. R0 – R38 400 per annum). The area can therefore be expected to have a high poverty level with associated social consequences such as not being able to pay for basic needs and services and poor living conditions.
- The main economic sectors within the Kai !Garib LM include agriculture (51.8%), community and government services (15.9%), wholesale and retail trade (11.3%), finance services (7.6%), and manufacturing (5.1%).
- The primary economic activities within the Dawid Kruiper LM comprise trade and retail as a result of the strong tourism and agricultural sectors.
- As of 2011 there were a total of 22 260 households within the Kai !Garib LM. This is equivalent to 32.9% of the total number of households within the ZF Mgcawu DM (67 468), and 7.1% of the total number of households within Northern Cape Province (313 402).
- The majority of households (56.3%) within the Kai !Garib LM comprise formal brick dwellings, while 1.7% comprise traditional dwellings, 4.3% comprise informal dwellings not in a backyard, and 0.4% comprise informal dwellings in a back yard.
- The majority of households within the Dawid Kruiper LM comprise formal brick dwellings, with only a very small proportion (0.8%) comprising traditional dwellings.

Services

- The Kai !Garib LM is poorly serviced in terms of public sector health facilities with 1 hospital located in Kakamas, and a number of clinics, satellite clinics, mobile facilities and community health centres throughout the LM.
- The Dawid Kruiper LM is poorly serviced in terms of public sector health facilities with 2 hospitals (one public and one private hospital), 2 Community Healthcare Centres (CHC) and 6 Fixed Primary Healthcare Clinics (CHC), and 5 Satellite Healthcare Clinics.
- The majority of households within the Kai !Garib LM are adequately serviced with regards to water, sanitation, electricity, and refuse removal, however there is significant room for improvement in terms of service deliver within the LM, with the LM often exhibiting lower levels of service provision than that of the ZF Mgcawu DM, Northern Cape Province, and South Africa as a whole.
- The majority of households within the Dawid Kruiper LM are well serviced with regards to water, sanitation, electricity, and refuse removal, with the LM often exhibiting higher levels of service provision than the ZF Mgcawu, Northern Cape Province, and South Africa.

CHAPTER 8: ASSESSMENT OF IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct and indirect) expected for the grid connection infrastructure associated with the Khunab Solar Development, which consists of four solar PV facilities.

This assessment has considered the construction and operation of grid connection infrastructure within a 300m wide and 13km long corridor which is considered necessary and essential associated infrastructure required for the evacuation of electricity from the Khunab Solar Development to the national grid. The grid connection infrastructure will comprise of the following key infrastructure and components:

- two (2) collector substations (known as the Khunab Collector Substation and Klip Punt Collector Substation), each including a switching station component;
- a 132kV overhead power line; and
- associated infrastructure such as access roads, feeder bays, a fibre and optical ground wire (OPGW) layout, insulation and assembly structure.

There is only one feasible grid connection solution to connect the solar PV facilities to the Upington MTS. The alternative option was identified as not technically feasible and suitable for development (as discussed in **Chapter 3**) and is therefore not assessed further in this BA report.

The full extent of the grid connection corridor (including the associated infrastructure) (refer to **Figure 8.1**) was considered through the specialist assessments undertaken as part of this BA process, as well as within this impact assessment report. The grid connection infrastructure will be appropriately sited within the grid connection corridor through the consideration of the sensitive environmental features present with avoidance of the features considered to be the preferred option.

The development of the grid connection infrastructure for the Khunab Solar Grid Connection will comprise the following phases:

- ***Pre-Construction and Construction*** – will include pre-construction surveys; site preparation; establishment of access roads (where required), laydown area; construction of foundations involving excavations; the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; the construction of the collector substations and power line infrastructure; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for the grid connection infrastructure is estimated to be up to 18 months.

- ***Operation*** – will include the operation of the two collector substations and the 132kV power line, which enable the evacuation of electricity from the four solar PV facilities into the national grid. The operation phase of the grid connection infrastructure is expected to be approximately 20 years (with maintenance).

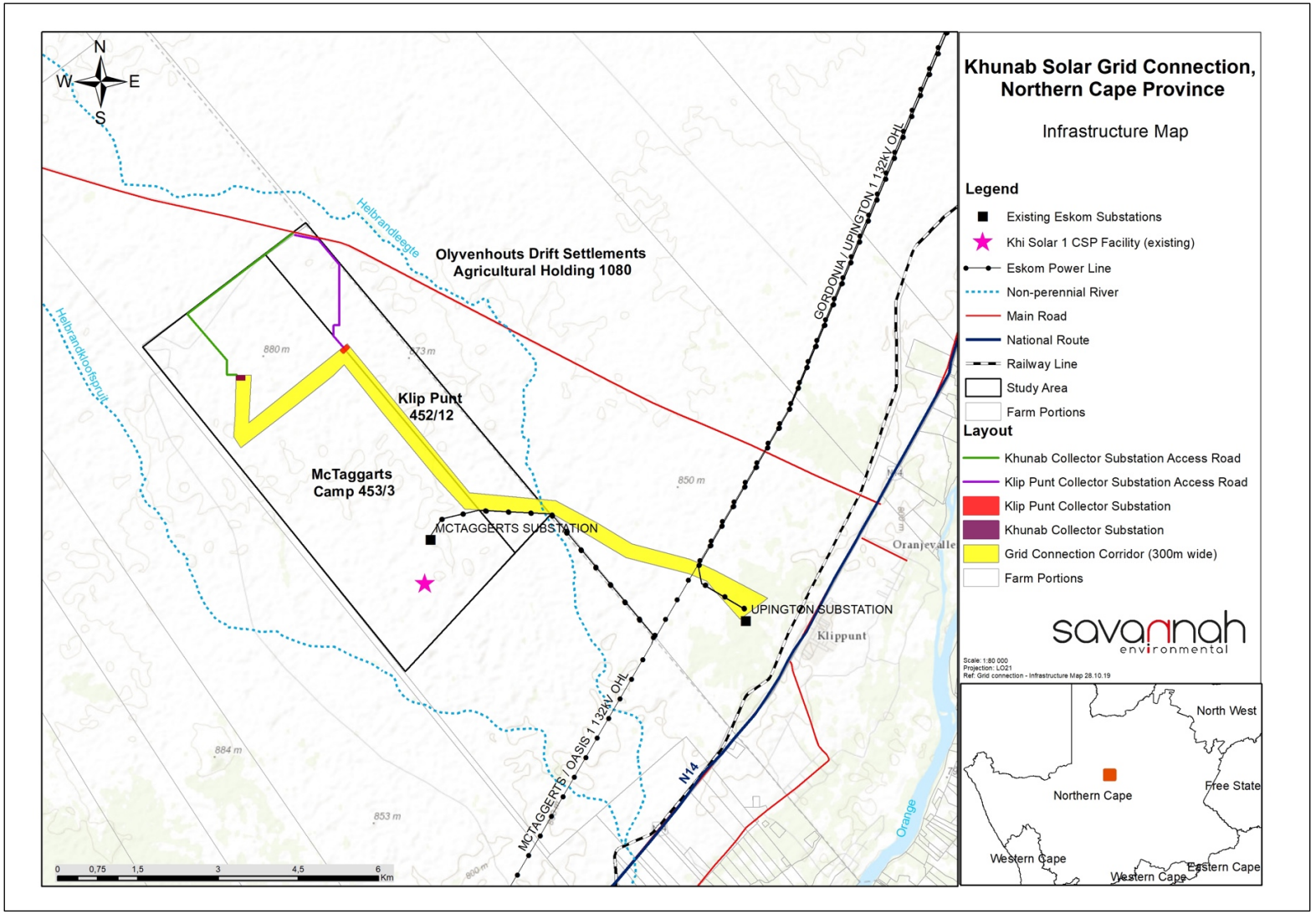

Figure 8.1: The Khunab Solar grid connection corridor associated with the grid connection solution for the Khunab Solar Development. The grid connection infrastructure (two collector substations and 132kV power line) will be constructed and operated within the 300m wide corridor. (refer to **Appendix M** for A3 maps).

» ***Decommissioning*** – depending on the economic viability of the Khunab Solar Development and Eskom's plans for the collector substations, the length of the operation phase may be extended beyond a 20-year period. This would also require the extension of the operation phase for the grid connection infrastructure. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the grid connection infrastructure, clearance of the relevant infrastructure at the collector substations and along the power line servitude, and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities. However, in some instances some sepecialists have identified and assessed specific decommissioning impacts associated with the project, these impacts are assessed as separate impact tables where relevant below.

Environmental issues associated with pre-construction, construction and decommissioning activities may include, among others, threats to biodiversity and ecological processes, including habitat alteration and impacts to fauna and avifauna, impacts to sites of heritage value, soil erosion and loss of agricultural land, and nuisance from the movement of vehicles transporting equipment and materials.

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

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

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

Requirement	Relevant Section
3(h)(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed, (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated.	The impacts and risk associated with the development of the grid connection infrastructure, including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3 and 8.8.3.
3(h)(vii) positive and negative impacts that the proposed activity will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The positive and negative impacts associated with the development of the grid connection infrastructure are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3 and 8.8.3.
3(h)(viii) the possible mitigation measures that could be applied and the level of residual risk.	The mitigation measures that can be applied to the impacts associated with the development of the grid connection infrastructure are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3 and 8.8.3.
3(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of	A description of all environmental impacts identified for the development of the grid connection infrastructure during the BA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3 and 8.8.3.

Requirement	Relevant Section
the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures,.	
3(j) an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts, (ii) the nature, significance and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.	An assessment of each impact associated with the development of the grid connection infrastructure, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3 and 8.8.3.
3(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3 and 8.8.3.

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

Site-specific impacts associated with the construction and operation of the grid connection infrastructure for the Khunab Solar Grid Connection relate to the direct loss of vegetation and species of special concern, disturbance of animals (including avifauna) and loss of habitat and impacts on soils. In order to assess the impacts associated with the development of the grid connection infrastructure, it is necessary to understand the extent of the affected grid connection corridor and the development footprint of the infrastructure proposed to be developed within the corridor. In this regard, the following is relevant:

- Each collector substation will occupy an area of ~1.15ha in extent. The total extent of the two collector substations, each including switching station components, will be ~2.30ha in extent.
- The 132kV power line will be constructed within a servitude of up to 36m in width over a distance of up to 13km. The power line towers are an average distance of 200m apart but can exceed 500m depending on the topography, terrain and sensitive environmental features to be spanned.

8.3. Assessment of impacts on Ecology (Flora and Fauna)

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

8.3.1 Results of the Ecological Impact Assessment

The grid connection corridor identified for the establishment of the Khunab Solar Grid Connection is restricted largely to low and moderate sensitivity habitat typical of the Upington area. The only feature of significant concern within the corridor is the Helbrandleegte River. The 132kV power line, associated main access roads and maintenance access roads to the grid connection infrastructure will traverse the Helbrandleegte River,

which crosses the 300m grid connection corridor at the south eastern corner of the Klip Punt farm 452. Impacts on this feature can be minimised through crossing the river at a point where impacts on woody vegetation in the riparian corridor can be minimised. Also, the spanning of the River is preferred in order to avoid infringement of the environmentally sensitive feature (**Figure 8.2**). According to the letter provided by the aquatics specialist the power line can span the river and pylons or towers are to be erected within a watercourse.

The majority of the grid connection corridor occurs within areas that are classified as "Other Natural Areas" and as such have not been identified as priority areas for biodiversity conservation. A small section of the grid corridor falls within a Critical Biodiversity Area 2 (CBA2). Given that there is only a small section of CBAs within the corridor, the impact would be low provided that mitigation measures are implemented from the development of the grid connection infrastructure. Therefore, the development of the grid connection infrastructure within a small section of the CBA 2 is considered to be acceptable.

There are no impacts associated with the establishment of Khunab Solar Grid Connection that cannot be mitigated to a low significance. As such, there are no fatal flaws or high post-mitigation impacts that should prevent the development from proceeding.

8.3.2 Description of Ecological impacts

The following ecological impacts have been identified for the development of the grid connector infrastructure:

» Impacts on vegetation and plant species of conservation concern due to construction and operation activities – Several protected species occur within the grid connection corridor which may be impacted by the development, most notably *Vachellia erioloba*, *Boscia albitrunca* and *Boscia foetida* subsp. *foetida*. The density of these species within the corridor is however low and *Vachellia erioloba* and *Boscia albitrunca* are restricted to the Helbrandleegte River. Vegetation clearing during the construction phase will lead to the loss of currently intact habitat within the corridor and is an inevitable consequence of the establishment of the Khunab Solar Grid Connection. As this impact is certain to occur during the construction phase, it is assessed for the construction phase only, as this is when the impact will occur, although the consequences will persist for a long time after construction has been completed.

»

» Faunal impacts due to construction activities - Increased levels of noise, pollution, disturbance and human presence during the construction phase will be detrimental to fauna. Sensitive and shy fauna would move away from the development during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during the construction phase and this impact is therefore assessed for the construction phase only.

»

» Habitat Degradation due to Erosion and Alien Plant Invasion during construction and operation activities - Disturbance within the grid connection corridor generated during the construction phase will leave the area vulnerable to erosion and alien plant invasion, which would lead to degradation of the local environment. Although, the disturbance would be created during the construction phase, the major impacts would manifest during the operation phase.

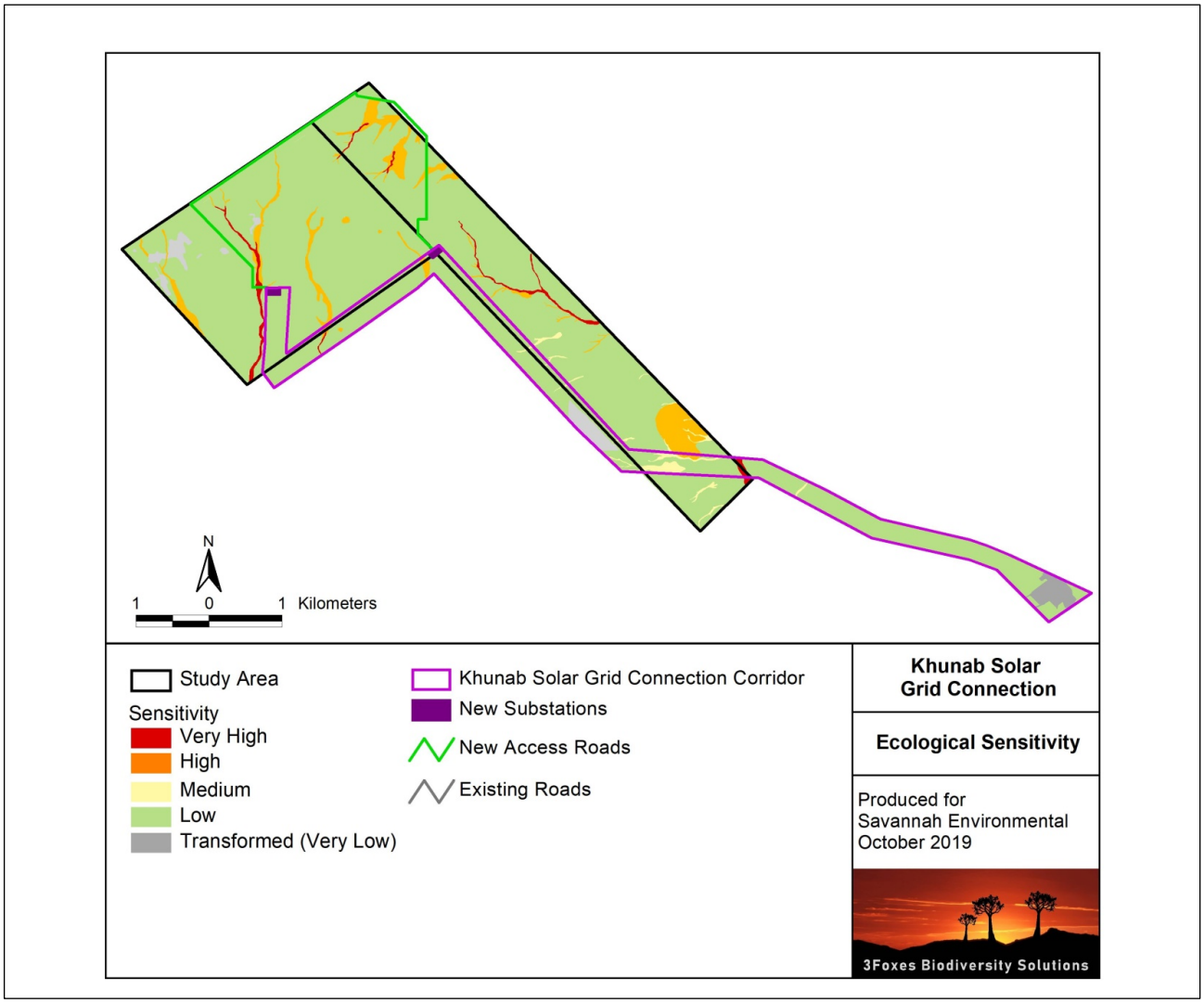

Figure 8.2: Ecological sensitivity map of the grid connection corridor proposed for the development of the Khunab Solar Grid Connection.

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

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

Planning and Construction Phase Impacts

Nature: *Impacts on vegetation and listed or protected plant species resulting from power line construction activities* Impacts on vegetation will occur due to disturbance and vegetation clearing associated with the construction of the power line and association infrastructure.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (3)	Medium-term (2)
Magnitude	Low (3)	Low (2)

Probability	Highly Likely (4)	Highly Likely (4)
Significance	**Low (28)**	**Low (20)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	This impact cannot be well mitigated because some loss of vegetation is unavoidable and is a certain outcome of the development.	

Mitigation:

- Pre-construction walk-through of the final development footprint must be undertaken in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act and DENC/DAFF permit conditions.
- Search and rescue of identified species of concern before construction.
- Vegetation clearing to commence only after the walk-through has been conducted and necessary permits obtained.
- Pre-construction environmental induction for all construction staff must be undertaken on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc.
- Contractor's Environmental Officer (EO) must provide supervision and oversight of vegetation clearing activities within sensitive areas.
- Vegetation clearing along the power line route should be kept to a minimum.
- All construction vehicles must adhere to clearly defined and demarcated roads. No off-road driving must be allowed outside of the construction area.
- Temporary laydown areas must be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.

Residual Impacts:
The loss of currently intact vegetation is an unavoidable consequence of the development and cannot be entirely mitigated. The residual impact would however be low.

Nature: *Faunal impacts due to construction activities*

Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction. This will however be transient and restricted to the construction phase.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low to Medium (4)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (21)**	**Low (15)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Partly, although noise and disturbance cannot be well mitigated, impacts on fauna due to human presence such as poaching can be mitigated.	

Mitigation:

- All personnel must undergo environmental induction with regards to fauna and, in particular, awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition.
- Any fauna threatened by the construction activities must be removed to safety by an appropriately qualified environmental officer.

- All construction vehicles must adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
- All hazardous materials must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill.
- If holes or trenches need to be dug for pylons or electrical cabling, these must not be left open for extended periods of time as fauna may fall in and become trapped in them. Holes must only be dug when they are required and must be used and filled shortly thereafter.

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

Operation Phase Impacts

Nature: *Faunal Impacts due to Operation*

The operation and maintenance of the Khunab Solar Grid Connection may lead to disturbance or persecution of fauna in the vicinity of the development.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (21)**	**Low (14)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To a large extent, but some low-level residual impact due to noise and human disturbance may occur during maintenance activities.	

Mitigation:

- Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operation activities must be removed to a safe location.
- If the substation must be lit at night for security purposes, this must be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects.
- All hazardous materials must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill.
- All vehicles must adhere to a low speed limit (30km/h for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises.
- If the substation perimeter is to be fenced, then no electrified strands must be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences because they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands must be placed on the inside of the fence and not the outside.

Residual Impact:
Disturbance from maintenance activities will occur at a low and infrequent level with the result that no long-term impacts are expected to occur.

Nature: Habitat Degradation due to Erosion and Alien Plant Invasion

Disturbance created during the construction phase will leave the development area vulnerable to erosion and alien plant invasion for several years into the operation phase.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (2)	Long-term (3)
Magnitude	Medium Low (3)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (18)**	**Low (12)**
Status	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	

Mitigation:

- Erosion management within the development area must take place according to the Erosion Management Plan and Rehabilitation Plan.
- Access roads must have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- Regular monitoring for erosion during operation must be undertaken to ensure that no erosion problems have developed as a result of the disturbance, as per the Erosion Management and Rehabilitation Plans for the project.
- All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
- There must be follow-up rehabilitation and re-vegetation of any remaining bare areas with indigenous perennial shrubs and succulents from the local area.
- Alien management at the site must take place in accordance with the Alien Invasive Management Plan.
- Regular monitoring for alien plant proliferation during the operation phase must be undertaken to ensure that no erosion problems have developed as result of the disturbance, as per the Alien Management Plan for the project.
- Woody alien plant species must be controlled on at least an annual basis using the appropriate alien control techniques as determined by the species present.

Residual Impacts:
Some erosion and alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact.

Decommissioning Phase Impacts

Nature: . Habitat Degradation due to Erosion and Alien Plant Invasion

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

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium (3)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (24)**	**Low (12)**
Status	Negative	Negative
Reversibility	Low	High

Irreplaceable loss of resources	Moderate	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	

Mitigation:

- Erosion management within the development area must take place in accordance with the Erosion Management and Rehabilitation Plan. This should make provision for monitoring of the development area for at least 3 years after the decommissioning phase.
- All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
- There must be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs, grasses and trees from the local area.
- Alien management at the site must take place according to the Alien Invasive Management Plan. This must make provision for alien monitoring and management for at least 3 years after decommissioning.
- Regular (annual) monitoring for alien plants during operation to ensure that no erosion problems have developed as result of the disturbance, as per the Alien Management Plan for the project.
- Woody aliens must be controlled on at least an annual basis using the appropriate alien control techniques as determined by the species present. This might include the use of herbicides where no practical manual means are available.

Residual Impacts:

Some erosion and alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact if effectively managed.

Nature: Direct Faunal Impacts due to Decommissioning Activities

Due to disturbance, noise and the operation of heavy machinery, faunal disturbance due to decommissioning will extend beyond the footprint and impact adjacent areas to some degree. This will however be transient and restricted to the period while machinery is operational. In the long term, decommissioning should restore the ecological functioning and at least some habitat value to the affected areas.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Low (4)	Minor (3)
Probability	Probable (3)	Probable (3)
Significance	**Low (18)**	**Low (15)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Although the noise and disturbance generated at the site during decommissioning is probably largely unavoidable, this will be transient and ultimately the habitat should be restored to something useable by the local fauna.	

Mitigation:

- All personnel must undergo environmental induction with regards to fauna and, in particular, awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition.
- Any fauna threatened by the decommissioning activities must be removed to safety by an appropriately qualified environmental officer.
- All vehicles must adhere to a low speed limit (30km/h for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises.

» All hazardous materials must be stored in the appropriate manner to prevent contamination of the site and ultimately be removed from the site as part of decommissioning. Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill. » The site must be rehabilitated with locally occurring species to restore ecosystem structure and function.
Residual Impacts: Although some components of disturbance cannot be avoided, the site itself would have low faunal abundance at decommissioning and no significant residual impacts are likely.

8.3.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of ecological impacts of the grid connection infrastructure can be reduced to low. From the outcomes of the study undertaken, it is concluded that the grid connection infrastructure can be developed as impacts will be of low significance. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas is detailed below:

» The final power line route must be subject to a preconstruction walk-through before construction commences and adjusted where required to reduce impacts on Species of Conservation Concern (SCC) and habitats of concern.
» Search and Rescue of SCCs must be conducted prior to clearing activities.
» If the collector substations are to be fenced, then no electrified strands must be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.
» Erosion management within the grid connection servitude must take place according to the Erosion Management Plan and Rehabilitation Plan.
» Alien and erosion management must be regularly implemented within the grid connection servitude.

8.4. Assessment of Impacts on Avifauna

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

8.4.1 Results of the Avifauna Impact Assessment

Important avian microhabitats play an integral role within the landscape, providing nesting, foraging and reproductive benefits to the local avifauna. In order to ensure that the development does not have a long-term negative impact on the local avifauna, it is important to delineate these avian microhabitats within the broader project site. An avian sensitivity map (refer to **Figure 8.3**) was generated by integrating avian microhabitats present within the grid connection corridor and avifaunal information collected during the site visits.

The broader study area supports three main avifaunal microhabitats, which are referred to as the plains, drainage lines, and small pans. These three habitats have marginally different sensitivities, due to the subtle differences in the avifaunal assemblages that they support. The plains habitat supports a mosaic of open gravel to sandy plains traversed by drainage lines, contributing to the habitat diversity of the area. The plains support the Near-Threatened Karoo Korhaan (primarily along the eastern boundary of the broader study area), Kori Bustard, and the Endangered Ludwig's Bustard in favourable years. In addition, the plains habitat also supports numerous protected trees, *B. foetida subsp. foetida,* and it is therefore considered to be of medium sensitivity, and medium high sensitivity in areas where Karoo Korhaan are abundant.

The drainage lines and small pans are a restricted habitat within the broader study area, and due to the denser vegetation, they support, can be considered to be of high Sensitivity even though red-listed species may not be directly associated with these habitats. The development of the grid connection infrastructure within the corridor on the lower sensitivity parts will generate low impacts on the avifauna, provided suitable mitigation measures are employed during construction and operation. The construction phase of the development would result in the temporary displacement of avifauna of local significance, such as Karoo Korhaan and Kori Bustard. Other species appear to occur too sparsely to be negatively impacted by disturbance during the construction phase.

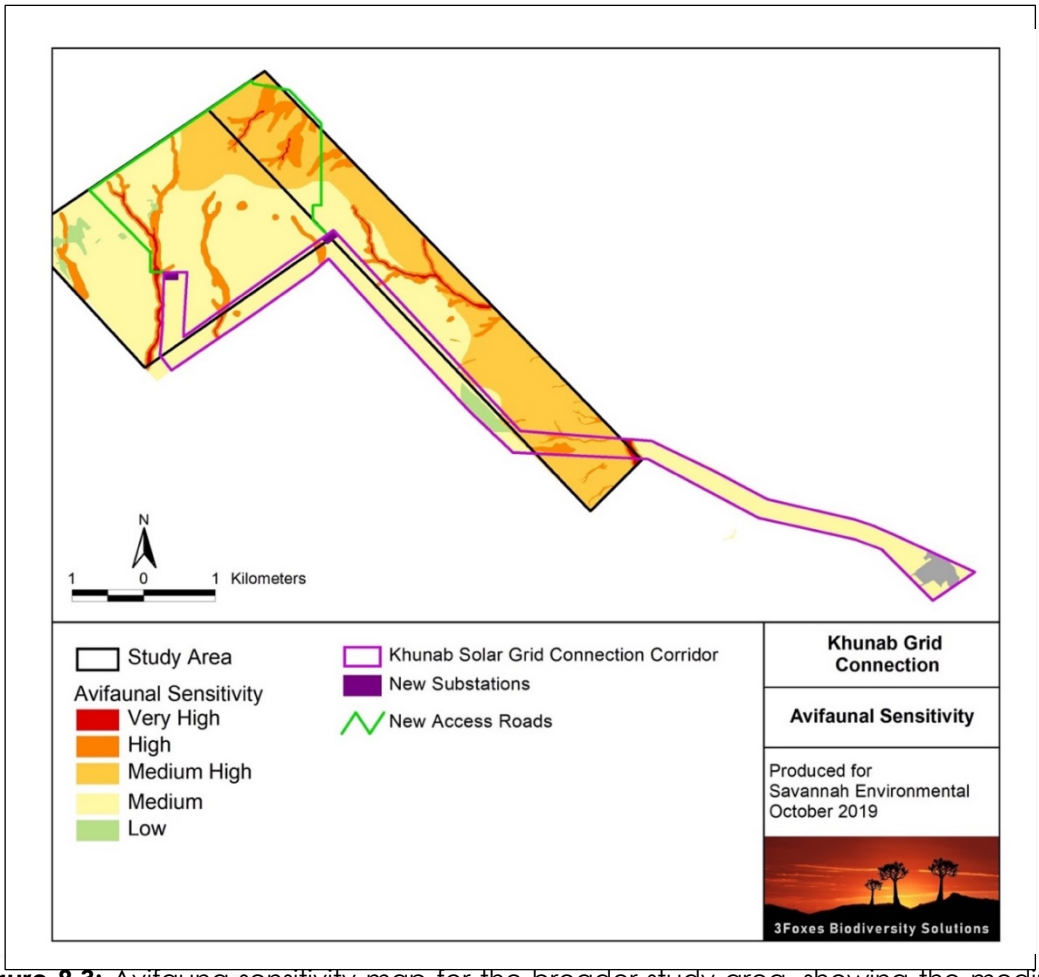

Figure 8.3: Avifauna sensitivity map for the broader study area, showing the medium sensitivity plains that cover most of the area, and high sensitivity drainage lines and small pans throughout

8.4.2 Description of Avifaunal Impacts

The nature of the avifauna impacts associated with the grid connection infrastructure will generally be negative given that Near- Threatened and Endangered birds may be susceptible to collision with the power line. However, the extent of the negative impacts will be local (i.e. along the 13km long 132kV power line). The duration of the impact will be long-term, for the lifetime of the power line, for all collision-prone species, however the significance of the impact can be reduced.

» *Habitat loss and disturbance of small passerines*
For the smaller passerine species, the most important impacts will involve temporary displacement from the area encompassed by the grid connection infrastructure footprint as a result of minor habitat destruction and disturbance. While numerous species will be impacted, all of these species have large distribution ranges and due to the temporary nature of the impact, will therefore experience insignificant population declines in the area, and not regionally or nationally. Some of the most abundant species which may be impacted, and which are also common in neighbouring habitats, include primarily the Spike-heeled Lark, Sabota Lark, Fawn-coloured Lark, Eastern Clapper Lark, Rufous-eared Warbler, Chat Flycatcher, and Black-chested Prinia, amongst others. The loss of habitat and disturbance will not be permanent during the operation phase of the grid connection infrastructure. The impacts in general can be expected to be minimal as these smaller species are far less susceptible to the associated impacts of power lines than larger-bodied species.

» *Habitat loss, disturbance and collision risk of medium terrestrial birds and raptors*
Small to medium-sized non-passerines that may be impacted to some extent due to habitat loss and displacement include resident raptors such as Pale Chanting Goshawk, and the terrestrial Namaqua Sandgrouse *Pterocles namaqua*, Northern Black Korhaan, Double-banded Courser *Rhinoptilus africanus*, and most importantly the Near-Threatened Karoo Korhaan. While some of these species may be susceptible to collisions with power lines, this is not expected to have a major impact on most of these species. Their smaller size and hence better manoeuvrability, as well as sedentary lifestyle and knowledge of their environs, ensures that they have a much lower probability of colliding with power lines.

» **Habitat loss, disturbance and collision risk of large terrestrial birds and raptors**
The group of primary concern is the medium to large non-passerines, which include the large terrestrial birds and diurnal raptors. Many of these are also red-listed, such as White-backed Vulture, Lappet-faced Vulture, Martial eagle, Tawny Eagle, Secretarybird, and the Near-Threatened Kori Bustard. Most of these species are susceptible to collisions with power lines owing to reduced ability to see the power lines and reduced manoeuvrability in flight to avoid collisions. However, the only species which are highly susceptible include Ludwig's Bustard, Kori Bustard and Secretarybird. An additional threat faced by the large raptors is electrocution when perched or attempting to perch on power line structures, but this depends largely on the type of pylons or towers used. Electrocutions can further be avoided to a large extent by employing suitable mitigation methods. Disturbances during construction of the grid connection is also expected to have a negative impact by temporarily displacing birds from foraging habitat. Hence it is essential that all impact mitigations are employed to ensure minimal potential disturbance and mortalities.

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

Planning and Construction Phase Impacts

Nature: Habitat loss and disturbance Small to medium-sized non-passerines that may be impacted to some extent due to habitat loss and displacement include resident raptors such as Pale Chanting Goshawk, and the terrestrial Namaqua Sandgrouse *Pterocles namaqua*, Northern Black Korhaan, Double-banded Courser *Rhinoptilus africanus*, and most importantly the Near-Threatened Karoo Korhaan		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (5)	Low to Moderate (4)
Probability	Highly likely (4)	Probable (3)
Status	Negative	Negative
Significance	**Medium (32)**	**Low (21)**
Reversibility	High	High
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	Although there will be some habitat loss that cannot be well mitigated, impacts on avifauna will be transient and of low magnitude during construction.	

Mitigation:

- Pre-construction walk-through of the grid connection route must be undertaken to identify areas of avifaunal sensitivity and where bird diverters must be installed on the power line.
- Prior to construction, the design and layout of proposed power lines must be endorsed by members of the Eskom-EWT Strategic Partnership, taking into account the mitigation guidelines recommended by Birdlife South Africa.
- Only power lines structures that are considered safe for birds must be erected to avoid the electrocutions of birds (particularly large raptors) perching or attempting to perch. Where necessary, deterrent devices such as bird guards must be mounted on relevant parts of the pylons to further reduce the possibility of electrocutions.
- The route that the grid connection corridor will follow must be the shortest distance possible across an area where collisions are expected to be minimal, and should traverse transformed habitats such as solar fields or follow existing power lines (as with this project), and be marked with bird diverters to make the lines as visible as possible to collision-susceptible species. Recommended bird diverters such as brightly coloured 'aviation' balls, thickened wire spirals, or flapping devices that increase the visibility of the lines must be fitted where considered necessary (collision hotspots).
- Impact near to important habitats such as at the major drainage lines traversed by the grid connection corridor, that may serve as breeding sites for large raptors, must be minimised.
- The potential to 'stagger' the position of the power line pylons in relation to existing telephone or power line poles/pylons must be investigated, as this may assist in increasing the visibility of power lines to large flying birds such as bustards, which may regularly fly through the area.
- All personnel must undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. bustards, korhaans, thick-knees and coursers), and owls, which are often persecuted out of superstition.
- All construction vehicles must adhere to clearly defined and demarcated roads. No off-road driving must be allowed outside of the construction area.
- The use of laydown areas within the footprint of the development must be used where feasible, to avoid habitat loss and disturbance to adjoining areas.

- » Any avifauna threatened by the construction activities must be removed to safety by the ECO or appropriately qualified environmental officer.
- » If lights are to be used at night for ensuring that infrastructure on site is lit, this must be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects. The use of lighting at night must be kept to a minimum, so as not to unnecessarily attract invertebrates and possibly their avian predators, and to minimise disturbance to birds flying over the facility at night.
- » Any avifauna threatened by the construction activities must be removed to safety by the ECO or appropriately qualified environmental officer.
- » All vehicles (construction or other) accessing the site must adhere to a low speed limit (40km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars, thick-knees and owls) which sometimes forage or rest on roads, especially at night.
- » No construction activity must occur near to active raptor nests should these be discovered prior to or during the construction phase. If there are active nests near construction areas, these must be reported to the ECO and monitored until the birds have finished nesting and the fledglings have left the nest.
- » If holes or trenches need to be dug for pylons, these must not be left open for extended periods of time as terrestrial avifauna or their flightless young may become entrapped therein. Holes must only be dug when they are required and be used and filled shortly thereafter.

Residual Impacts:
The loss of habitat associated with the grid connection corridor is an unavoidable consequence of the power line construction and remains a residual impact even after mitigation and avoidance of more sensitive areas. The total residual impact of habitat loss would however be low. Although the use of power line structures that are considered safe for large birds will contribute to reducing the potential impacts of the power line, future collisions with power lines will remain a risk. This can be reduced further by 'staggering' the pylons in relation to existing pylons during construction, rather than aligning the pylons of adjacent power lines, so that the profile of the combined power lines will be more visible to flying birds.

Operation Phase Impacts

Nature: Collisions, electrocution and disturbance
While some species may be susceptible to collisions with power lines, this is not expected to have a major impact on most of the species. Their smaller size and hence better manoeuvrability, as well as sedentary lifestyle and knowledge of their environs, ensures that they have a much lower probability of colliding with power lines.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Likely (4)	Probable (3)
Significance	**Medium (44)**	**Low (27)**
Status	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	To a large extent, although bird flappers and other bird diverters are not 100% effective in reducing bird collisions and electrocutions, and therefore there would still be some residual impact.	

Mitigation:
- » Regular monitoring of power lines must be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact to be marked with bird diverters.
- » Any movements by vehicle and personnel must be limited to the footprint of the grid connection corridor and associated infrastructure, especially during routine maintenance.

- » Any raptor nests that are discovered on the power line structures must be reported to the ECO, while utmost care must be taken to not disturb these nests during routine maintenance procedures.
- » Impact near important habitats such as stands of large trees, particularly in major drainage lines, that may be breeding sites for large raptors, must be minimised.

Residual Impacts:
Deterrent devices such as bird guards to reduce electrocutions, and flight diverters to reduce the risk of collisions with power lines are not 100% effective and some residual impact is likely to occur.

Decommissioning Phase Impacts

Nature: Some habitat disturbance/loss and disturbance due to traffic and presence of personnel.
Disturbances during construction of the grid connection is also expected to have a negative impact by temporarily displacing birds from foraging habitat. Hence it is essential that all impact mitigations are employed to ensure minimal potential disturbance and mortalities.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (4)	Low to Moderate (3)
Probability	Highly Likely (4)	High Likely (4)
Significance	**Low (28)**	**Low (24)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	The disturbance impact can be mitigated to an extent as it will be transient and have no long-term impact.	

Mitigation:

- » All infrastructure must be removed from the development site and disposed of in the appropriate manner.
- » All waste produced during decommissioning must be disposed of at a designated waste management facility.
- » Environmental induction for all personnel on site must be provided to ensure that basic environmental principles are adhered to, and awareness about not harming or hunting terrestrial species (e.g. bustards, korhaans, thick-knees and coursers), and owls, which are often persecuted out of fear or superstition.
- » This induction must also include awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, and remaining within demarcated decommissioning areas.
- » All construction vehicles must adhere to clearly defined and demarcated roads. No off-road driving must be allowed in undisturbed natural areas outside of the decommissioning area.
- » All vehicles must adhere to a low speed limit (40km/h on site) to avoid collisions with susceptible species such as nocturnal and crepuscular species (e.g. nightjars, thick-knees and owls) which sometimes forage or rest along roads.
- » Any avifauna threatened by the activities must be removed to safety by the ECO or appropriately qualified environmental officer.
- » If holes or trenches need to be dug, these must not be left open for extended periods of time as terrestrial avifauna or their flightless young may become entrapped in them. Holes must only be dug when they are required and be used and filled shortly thereafter.
- » No activity must occur near active raptor nests should these be discovered prior to or during the decommissioning phase. If there are active nests near the decommissioning areas, these must be reported to the ECO and monitored until the birds have finished nesting and the fledglings left the nest.
- » All disturbed and cleared areas must be revegetated with indigenous perennial shrubs and grasses from the local area.

Residual Impacts:

Disturbance during the decommissioning phase is an unavoidable consequence but will have low residual impact with implementation of the mitigation measures. Although the sensitivity of the affected habitat ranges from medium to very high, the overall residual impact on avifaunal habitat loss remains low as the habitat can be readily rehabilitated due to small footprint of the pylon infrastructure.

8.4.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of avifauna impacts associated with the grid connection infrastructure for the Khunab Solar Grid Connection can be reduced low, depending on the impacts being considered.

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

- Where a power line traverses a risk area (medium and high) bird spirals or dynamic bird diverters/flappers must be installed on the earth wires to reduce the risk of impacting birds, especially for the Red Listed Species Ludwig Bustard.
- All construction vehicles accessing the site must adhere to a low speed limit (40km/h max for heavy vehicles and 30km/h max for light vehicles) to avoid collisions with susceptible species such nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest along roads.
- Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment, and suitable dust and erosion control mitigation measures should be included in the EMPr.
-

8.5. Assessment of Impacts on Land Use, Soil and Agricultural Potential

The impact of the grid connection infrastructure on the soils, land use, land capability and agricultural potential has been assessed as low or medium (after mitigation), depending on the impact being considered. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G** for more details). The assessment report assessed the entire extent of the grid connection corridor, as well as the grid connection infrastructure, including the two collector substations and the 132kV power line.

8.5.1 Results of the Land Use, Soil and Agricultural Potential Study

The current land use being undertaken within the grid connection corridor is extensive grazing (specifically sheep grazing) and the corridor is dominated by natural vegetation.

There are six different soil forms present within the grid corridor. The soils present are not considered susceptible to erosion by water. However, if the vegetation cover is disturbed (for example by overgrazing or construction activities) and considering the sandy nature of the topsoils, as well as the dry climate, there is a significant possibility of removal of some or all of the topsoil by wind action. This can be mitigated by ensuring that a minimum area is disturbed, and that rehabilitation of surface vegetation is carried out as soon as possible.

There are no high potential soils present and the soils are of moderate potential at best, due mainly to the sandy texture which will lead to rapid water infiltration and the soils drying out. The soil type that is predominantly present in the grid corridor is Mispha/Glenrosa/Coega/Brandvlei. In addition, the low rainfall in the area means that there is little potential for rain-fed arable agriculture in the area. Arable production would, therefore, be possible only by irrigation.

In general, the soils that do occur along the corridor are suited for small stock grazing at best and furthermore the grazing capacity of the area is very low, at around 30-40 ha/large stock unit.

8.5.2 Description of Land Use, Soil and Agricultural Potential Impacts

Three impacts have been identified to be associated with the development of the grid connection infrastructure from a soil's perspective. These impacts include:

- Soil erosion is anticipated due to slope and vegetation clearance. The impacts of soil erosion are both direct and indirect. The direct impacts are the reduction in soil quality which results from the loss of nutrient-rich upper layers of the soil and the reduced water-holding capacity of severely eroded soils. The off-site indirect impacts of soil erosion include the disruption of riparian ecosystems and sedimentation.
-
- Although wind erosion may have an impact before revegetation on adjacent bare areas, the loss of soil as a resource is restricted to the actual footprint of the Khunab Solar Grid Connection. The only impact that may have effects beyond the footprint area is erosion which may cause the sedimentation of the adjacent watercourses.
-
- Soil chemical pollution as a result of storage of hazardous chemicals, concrete mixing, temporary sanitary facilities and potential oil and fuel spillages from vehicles. This impact will be localised within the grid connection corridor boundary.
-

  Soil chemical pollution during the operation phase will be minimal. Possible sources are oil that need to be replaced and fuel spillage from maintenance vehicles. This impact will be localised within the grid connection corridor boundary.

- In areas of permanent changes such as roads and substations, the current land capability and land use will be lost permanently. This impact will also be localised within the grid connection corridor boundary, as well as the main access roads providing access to the grid connection infrastructure.
-

  All infrastructure and activities required for the operation phase will be established during the construction phase. Once the construction phase is completed, a number of impacts remain during the operation phase. During the operation phase the impacts related to loss of land use and land capability will stay the same. Areas under permanent infrastructure are no longer susceptible to erosion, but hard surfaces will increase run-off during rainstorms onto bare soil surfaces.

The main activity that will result in the impacts on soil relates to the excavations required for the two collector substations, power line towers and access roads which could lead to wind erosion.

8.5.3 Impact tables summarising the significance of impacts on Land Use, Soil and Agricultural Potential during construction, operation and decommissioning (with and without mitigation)

Nature: Soil Erosion

The construction of the Khunab Solar Grid Connection will require the clearing and levelling of a limited area of land. The following construction activities will result in bare soil surfaces that will be at risk of erosion:

1. vegetation removal during site clearing;
2. creating impenetrable surfaces during the construction phase that will increase run-off onto bare soil surfaces; and
3. leaving soil surfaces uncovered during the rainy season during the construction phase.

During the operation phase the impenetrable surfaces such as paved areas and covered roads stay intact, however, the impact of increased run-off persists on surrounding areas.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint;
» Unnecessary land clearance must be avoided;
» Soil stockpiles must be dampened with dust suppressant or equivalent substances;
» Soil stockpiles must be located away from any waterway or preferential water flow path in the landscape, to minimise soil erosion from these;
» Geo-textiles must be used to stabilise soil stockpiles and uncovered soil surfaces during the construction phase and to serve as a sediment trap to contain as much soil as possible that might erode away;
» The Stormwater Management Plan (SWMP) should provide for a drainage system sufficiently designed to prevent water run-off from the solar panels to cause soil erosion;
» Where discharge of rainwater on roads will be channelled directly into the natural environment, the application of diffuse flow measures must be included in the design; and
» Revegetate cleared areas as soon as possible after construction activities.

Residual Impacts:

The residual impact from the construction and operation of the Khunab Solar Grid Connection infrastructure on the susceptibility to erosion will be negligible.

Nature: Chemical pollution of soil

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

1. Hydro-carbon spills by machinery and vehicles during earthworks and the mechanical removal of vegetation during site clearing.
2. Spills from vehicles transporting workers, equipment and construction material to and from the construction site.

3. Accidental spills from temporary chemical toilets used by construction workers.
4. The generation of domestic waste by construction and operation workers.
5. Spills from fuel storage tanks during construction.
6. Polluted water from wash bays and workshops during the construction phase.
7. Accidental spills of other hazardous chemicals used and stored on site.
8. Pollution from concrete mixing.

The operation of the grid connection infrastructure can result in the chemical pollution of the soil through the following activities:

1. Spills from vehicles transporting workers and equipment to and from the grid connection corridor.
2. Accidental spills of other hazardous chemicals used and stored on site.

	Without mitigation	**With mitigation**
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» High level maintenance must be undertaken on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills;
» Impermeable and bunded surfaces must be used for storage tanks and to park vehicles on;
» Site surface water and wash water must be contained and treated before reuse or discharge from site;
» Spills of fuel and lubricants from vehicles and equipment must be contained using a drip tray with plastic sheeting filled with adsorbent material;
» Spill kits must be available on site and must be serviced regularly;
» Waste disposal at the construction site and during operation must be avoided by separating, trucking out and recycling waste;
» Potentially contaminating fluids and other wastes must be contained in containers stored on hard surface levels in bunded locations; and
» Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately by trained staff with the correct equipment and protocols as outlined in the EMPr (**Appendix K**).

Residual Impacts:

The residual impact from the construction and operation of the proposed grid connection infrastructure will be low to negligible

Nature: Land capability

The land capability of the development footprint of the grid connection infrastructure where soil layers are changed and construction of infrastructure is done, will be lost. The impact remains present through the operation phase. The following activities can result in the loss of land capability within the grid connection infrastructure development footprint:

1. The removal of vegetation during site clearing;
2. Earthworks which destroy the natural layers of the soil profiles; and
3. The construction of access roads, collector substations and power line infrastructure which will cover soil surfaces.

	Without mitigation	**With mitigation**

Extent	Local (1)	Local (1)
Duration	Permanent (3)	Permanent (3)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (4)	Probable (4)
Significance	**Medium (40)**	**Medium (32)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: » Keep the grid connection infrastructure development footprint as small as possible.		
Residual Impacts: The residual impact from the construction and operation of the Khunab Solar Grid Connection will be of low significance.		

The impacts considered and assessed for construction will be similar in impact and significance for the decommissioning phase.

8.5.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the grid connection infrastructure for Khunab Solar Development can be reduced to low or medium, depending on the impact being considered. From the outcomes of the studies undertaken, it is concluded that the grid connection infrastructure can be developed and impacts on soils managed by taking the following into consideration:

» Minimise the footprint of construction as much as possible.
» Where soil is removed/disturbed, ensure it is stored for rehabilitation and re-vegetated as soon as possible.
» Implement all appropriate soil conservation measures, including contouring, culverts etc. (for road construction), geotextiles and slope stabilisation (for all infrastructure), where required.

8.6. Assessment of Impacts on Heritage Resources

Negative impacts on heritage resources will be due to loss during construction activities and an impact on the cultural landscape during the operation of the grid connection infrastructure. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H** for further details). The heritage impact assessment assessed the full extent of the grid connection corridor, as well as the grid connection infrastructure, including the two collector substations and 132kV power line.

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

The proposed development will not have a negative impact on the heritage resources situated within the grid connection corridor within which the power line servitude will be placed. The lithic and historic material identified is of low significance, and even though the resources may be destroyed during the construction, the impact is inconsequential.

Based on the specialist's knowledge and research of previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the loose sands of the Quaternary Formation. There is a very small chance that fossils may occur in the adjacent shales of the early Permian Vryheid Formation so a Chance Find Protocol should be added to the EMPr (**Appendix K**). All proposed infrastructure lies on the Gordonia Formation dune and aeolian sands and as far as the palaeontology is concerned there is no impact anticipated.

8.6.2 Description of the Heritage Impacts

Impacts to archaeological resources would occur only during the construction phase when foundations are excavated, and the service road is cleared. The impacts would be direct since the excavations might damage or destroy archaeological materials. The probability of impacts occurring is extremely unlikely with the resultant significance of impacts being low before mitigation and therefore after mitigation impacts were not assessed. Without mitigation the magnitude and probability of the impact is low. There are no fatal flaws expected to occur with regards to archaeological resources.

Impacts to palaeontological resources would occur only during the construction phase when foundations are excavated, and the service road cleared. The impacts would be direct since the excavations might damage or destroy fossils if they are uncovered. The magnitude of the impact would be low since, fluvial and aeolian sands do not preserve fossils; only palaeo-pans might but none has been recorded. Palaeo-channels might contain fossil wood and bones, but none has been recorded within the grid connection corridor. The impact would be very unlikely. As a result of low impacts on palaeontology before mitigation there are no impacts applicable or expected after mitigation has been implemented. Since fossils within the area would be from palaeo-pans or palaeo-channels, if present, the spatial scale will be localised within the boundary of the grid connection corridor.

8.6.3 Impact tables summarising the significance of impacts on heritage related to the grid connection infrastructure during construction, operation and decommissioning (with and without mitigation)

Nature: Impacts to Palaeontological Resources No heritage resources of significance were identified during the field assessments for palaeontology within grid connection corridor		
	Without mitigation	**With mitigation**
Extent	Local (1)	N/A
Duration	Permanent (5)	N/A
Magnitude	Low (2)	N/A
Probability	Very Improbable (1)	N/A
Significance	**Low (8)**	N/A
Status (positive or negative)	Neutral	N/A
Reversibility	Irreversible	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	Yes	
Mitigation: No impacts are anticipated and as such, no mitigation is required. A Fossil Chance Find protocol must however be added to the EMPr (**Appendix K**) for any potential discoveries during construction.		
Residual Impacts: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.		

Nature: Impacts to Archaeology Resources No heritage resources of significance were identified during the field assessments for archaeology within the grid connection corridor		
	Without mitigation	**With mitigation**
Extent	Local (1)	N/A
Duration	Permanent (5)	N/A
Magnitude	Low (2)	N/A
Probability	Very Improbable (1)	N/A
Significance	**Low (8)**	N/A
Status (positive or negative)	Neutral	N/A
Reversibility	Irreversible	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	N/A	
Mitigation: No impacts are anticipated and as such, no mitigation is required.		
Residual Impacts: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.		

The impacts considered and assessed for construction will be similar in impact and significance for the decommissioning phase.

8.6.4 Implications for Project Implementation

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

- An archaeologist must be appointed to conduct a final pre-construction survey of the approved layout (i.e. the route of the 132kV power line and the location of the two collector substations within the grid connection corridor) at least 6 months prior to commencement of construction.
- A chance finds procedure must be implemented for the rescuing of any fossils discovered during construction.
- All work is to be carried out within the authorised construction footprint (i.e. grid connection corridor). Any new areas, outside of the corridor, that may need to be disturbed must be surveyed for archaeological sites prior to disturbance.
- If any archaeological material or human burials are uncovered during the course of development, then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

8.7. Assessment of Visual Impacts

Negative impacts on visual receptors will occur during the undertaking of construction activities and the operation of the Khunab Solar Grid Connection. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I** for further details). The visual impact assessment

assessed the entire extent of the grid connection corridor, as well as the grid connection infrastructure, including the two collector substations and 132kV power line.

8.7.1 Results of the Visual Impact Assessment

The Visual Absorption Capacity (VAC) of the landscape is relatively low considering the height of the structures proposed to be developed within the grid connection corridor, the relatively flat nature of the topography and low natural vegetation.

The visibility of the proposed project is largely limited by the relatively slender nature of the taller structures and the overhead power line and by the ability of the human eye to differentiate these elements over distance.

From observations of similar power lines, the following visual limits were set:

Infrastructure	Main area of visual influence	Approximate Limit of Visibility (ALV)
132kV power line	3km	20.2km
Collector substations	3km	11.3km

The Zones of Theoretical Visibility (ZTV) analysis indicates that the power line is likely to be visible throughout the majority of the Approximate Limit of Visibility.

The proposed project could impact on two distinct Landscape Character Areas (LCAs), namely:

» Plateau LCA which includes the gently undulating, arid plateau above the Orange River Valley. This area is generally natural in character with very little settlement. The character of this area is in transition in that solar projects and existing grid infrastructure are likely to create an industrial aesthetic within a matrix of natural vegetation. VAC within this area is only provided by the regular, low, dune formation as well as slopes of the slightly larger minor valleys that are associated with the non-perennial water courses that flow into the Orange River Valley.
» The River Corridor LCA is comprised of the shallow valley area surrounding the Orange River. This area is generally inward looking drawing little character influence from the surrounding plateau. Landform, vegetation and development all play a role in screening views of surrounding areas.

The power line and collector substations will mainly influence the Plateau LCA and will have negligible influence over the River Corridor LCA. No protected areas are likely to be affected.

Identified visual receptors include:

» Area Receptors including the minor urban settlement areas that are located within the River Corridor LCA;
» Linear Receptors or routes through the area including the N14, the R359, and the Lutzputs Road. The un-surfaced Lutzputs Road is predominantly used by local people; and
» Point Receptors that include individual homesteads that are located both within the River Valley LCA and the Plateau LCA.

8.7.2 Description of the Visual Impacts

The Approximate Limit of Visibility (ALV) of the collector substations indicates that they are only likely to affect the arid plateau and that the collector substations may be visible from the Lutzputs Road but are unlikely to be visible from any other receptor.

The development of a power line within the proposed corridor is only likely to affect sections of the landscape and sensitive receptors that are already affected by solar projects and the associated grid connection infrastructure.

The proposed project will therefore not impact negatively on landscape areas outside those that are already affected by existing industrial infrastructure (including renewable energy projects and the associated grid connection infrastructure). Because of this, the landscape impact is assessed as being likely to have a low significance and a neutral status.

The following visual impacts have been identified as assessed as part of the Visual Impact Assessment.

Impact on views from the N14

The proposed collector substations are highly unlikely to be visible from the N14 and therefore will have no visual impact.

The ALV of the proposed grid connection corridor indicates that a power line developed in the corridor could be visible for approximately 5.9km of the road at a minimum distance of less than 2km. However, the power line will be seen through other electrical infrastructure including a high-voltage power line and the Upington MTS.

The proposed corridor alignment approaches the road at a right angle which means that the power line will not run along the length of the road and the power line is likely to become less obvious the further the viewer is from the line.

The development of the power line within the proposed corridor was assessed as likely to have a visual impact of low significance on the N14. Given the fact that the development will occur within an area affected by other industrial infrastructure (including solar projects and their associated infrastructure) and because the proposed power line will be viewed through other existing electrical infrastructure, this impact was assessed as being likely to have a neutral status.

The impact on views from the R359

The proposed collector substations will not be visible from this road. A power line developed within the proposed corridor is unlikely to be visually obvious from this road. The visual impact of the development was therefore assessed as being very improbable, having a low significance and a neutral status.

The ZTV analysis indicates that the proposed collector substations could be visible over approximately 6.5km of the road but only one (Klip Punt Collector Substation) is likely to be visually obvious over approximately 4.5km.

There is a minor ridge between the road and the substation. The Klip Punt PV1 facility solar arrays (assessed as part of a separate Basic Assessment Process) will also be located between the substation and the road. Both of these elements will provide a degree of screening; however, the bulk of the substation will be visible over these.

The impact on views from the Lutzputs Road

The ZTV analysis indicates that the power line could be visible over approximately 12.6km of the road, however, it will be seen from close to the Approximate Limit of Visibility and therefore is unlikely to be highly obvious.

The power line will be viewed in the context of other industrial infrastructure (including solar projects and associated electrical infrastructure) as well as strategic power lines and the Upington MTS.

The visual impact of the development was therefore assessed as being probable, having a low significance and a neutral to negative status.

The development could change the character of the landscape as seen from local homesteads.

The proposed collector substations will not be visible from existing homesteads.

There are two homesteads on the Plateau to the north west of the N14 from which the power line may be visible, however, these homesteads are located close to the adjacent Sirius Solar PV One project. One homestead is located within the property on which the Sirius Solar PV One project is under development. It is likely that grid connection infrastructure associated with that project will be more obvious. The project was under construction at the time of compilation of this report.

The grid connection corridor runs within 2.9km from the closest homestead. At this distance the overhead power line is unlikely to be visually obvious.

Given the distance involved and the other intervening projects, the proposed project was assessed as being likely to have an improbable visual impact of low significance and neutral to negative status.

All local settlements are located close to or within the Orange River Corridor.

The impact on views from local settlements

The ZTV analysis indicates that the proposed collector substations will not be visible from settlements.

The closest settlement is located approximately 1.4km from the eastern end of the grid connection corridor. It is likely that a power line developed in the corridor will be visible from this settlement. However, the new power line will be viewed through other electrical infrastructure including an existing high-voltage power line as well as the Upington MTS.

Given the distance involved and the other exsting infrastructure, the proposed project was assessed as being likely to have an improbable visual impact of low significance and neutral to negative status.

The impact of lighting associated with the project

Only the collector substations will be lit. Lighting is likely to include:

» Security lights that will light the substations to a level sufficient to ensure that security cameras can operate at night.
» Low level operational lights around buildings; and
» Flood lighting that may be required for emergency work during the hours of darkness.

This could result in the substations being obvious at night from surrounding areas.

The Khi Solar One project approximately 4.5km to the south appears relatively dark at night. There are obvious lights from Upington, from the Upington MTS as well as from passing traffic and small settlements and homesteads particularly in the Orange River Valley.

The area therefore is not completely dark during the night. There is therefore potential for the project to add to these existing lighting levels but with appropriate mitigation the level of lighting is likely to be similar to the current scenario experienced within the area. With mitigation therefore lighting impacts are improbable with a low significance and neutral status.

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

Construction and Operation Phase Impacts

Nature of impact: The development could change the character and sense of place of the landscape setting (Landscape Change)

The proposed grid connection corridor is located within an arid plateau landscape area and at their closest are within approximately 1.5km from the closest section of the verdant Orange River Corridor.

The proposed collector substations are also located within arid plateau landscape area and approximately 10.6km from the Orange River Corridor.

The Approximate Limit of Visibility (ALV) of the collector substations indicates that they are only likely to affect the arid plateau and that they may be visible from the Lutzputs Road, but they are unlikely to be visible from any other receptor.

The ALV of the proposed grid connection corridor alignment also indicates that the power line is likely to largely be visible from the arid plateau landscape. It also indicates however, that it could be seen from a section of the Orange River Corridor to the south east of the corridor alignment.

It is highly unlikely that a power line within the proposed corridor will be obvious from the Orange River Corridor. It is possible that the power line could be visible to a small number of homesteads, the Lutzputs Road, the N14 and small settlements on the edge and within the Orange River Corridor. However:

» The affected homesteads are located close to the Approximate Limit of Visibility (ALV);
» From the N14, the power line will be viewed through other closer electrical infrastructure including a high-voltage power line and the Upington MTS.

» From the Lutzputs Road the power line will be viewed close to the ALV and in the context of other electrical infrastructure including Khi Solar One and its existing grid connection power line that follows a similar route; and
» Small settlement areas that could be affected are located on the edge and within the Orange River Corridor which is unlikely to be affected to any significant degree.
»

The development of a power line and the collector substations within the grid connection corridor is only likely to affect sections of the landscape and sensitive receptors that are already affected by existing grid infrastructure and solar projects.

	Without mitigation	**With mitigation**
Extent	**Orange River LCA** Site and immediate surroundings (2) **Plateau LCA** Site and immediate surroundings (2)	**Orange River LCA** Site and immediate surroundings (2) **Plateau LCA** Site and immediate surroundings (2)
Duration	**Orange River LCA** Long term (4) **Plateau LCA** Long term (4)	**Orange River LCA** Long term (4) **Plateau LCA** Long term (4)
Magnitude	**Orange River LCA** Small (0) **Plateau LCA** Small (1)	**Orange River LCA** Small (0) **Plateau LCA** Small (1)
Probability	**Orange River LCA** Very improbable (1) **Plateau LCA** Improbable (2)	**Orange River LCA** Very improbable (1) **Plateau LCA** Improbable (2)
Significance	**Orange River LCA** **Low (6)** **Plateau LCA** **Low (14)**	**Orange River LCA** **Low (6)** **Plateau LCA** **Low (14)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. Neutral	Neutral
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operation phase. Therefore, there will be no irreplaceable loss. However, given the likely long-term nature of the project, it is possible that a proportion of stakeholders may consider the loss of view as irreplaceable.	No irreplaceable loss
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance	N/A

Mitigation:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- Ensure that vegetation is not unnecessarily removed during the construction period.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
- Align the power line as far from identified receptors as possible within the grid connection corridor.

Residual Impacts:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

Nature: The development could change the character of the landscape as seen from the N14

The grid connection corridor is located approximately 1.5km from the N14. The collector substations are located approximately 10.6km from the N14.

The ALV of the collector substations indicates that the collector substations are highly unlikely to be visible from the N14.

The ALV of the proposed grid connection corridor alignment indicates that a power line developed in the corridor could be visible for approximately 5.9km of the road at a minimum distance of less than 2km. However, the power line will be seen through other electrical infrastructure including a high-voltage power line and the Upington MTS.

The corridor alignment approaches the road at a right angle which means that the power line will not run along the length of the road and the power line is likely to become less obvious the further the viewer is from the line.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small to minor (1)	Small to minor (1)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (14)**	**Low (14)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. Neutral	Neutral
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operation phase. There will therefore be no irreplaceable loss. However, given the likely long-term nature of the project, it is possible that a proportion of stakeholders may consider the loss of view as irreplaceable.	No irreplaceable loss
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	

Mitigation:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- Ensure that vegetation is not unnecessarily removed during the construction period.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
- Align the power line as far from identified receptors as possible within the grid connection corridor.

Residual Impacts:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

Nature: The development could change the character of the landscape as seen from the R359.

The ALV of the collector substations indicates that they are highly unlikely to be visible from the R359.

The ALV of the grid connection corridor alignment indicates that a power line developed in the corridor is highly unlikely to be visible from this road. Should it be visible the power line will be viewed through other electrical infrastructure including a high-voltage power line as well as the Upington MTS. Also given the extent of vegetation within the Orange River Valley between the road and the project, it is highly unlikely that the project will be visible from the road.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Small (0)
Probability	Very improbable (1)	Very improbable (1)
Significance	**Low (6)**	**Low (6)**
Status	Given that neither the collector substations nor the power line is likely to be visually obvious and if small sections of the development are visible they will be seen in the context and behind other existing grid infrastructure, the change in view is unlikely to be seen as a negative impact. Neutral impact.	Neutral Impact
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operation phase. There will therefore be no irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	

Mitigation:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- Ensure that vegetation is not unnecessarily removed during the construction period.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

» Align the power line as far from identified receptors as possible within the identified grid connection corridor.
Residual Risks: The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

Nature: The development could change the character of the landscape as seen from the Lutzputs Road

The ZTV analysis indicates that the proposed collector substations could be visible over approximately 6.5km of the road but only one (Klip Punt Collector Substation) is likely to be visually obvious (within the Area of Visual Influence) over approximately 4.5km.

There is a minor ridge between the road and the Klip Punt Collector Substation. The Klip Punt PV1 facility solar arrays (assessed as part of a separate Basic Assessment process) will also be located between the substation and the road. Both of these elements will provide a degree of screening; however, the bulk of the substation will be visible over these.

The ZTV analysis indicates that the power line could be visible over approximately 12.6km of the road, however, it will be seen close to the ALV and therefore is unlikely to be highly obvious.

The power line will be viewed in the context of other grid connection infrastructure and existing solar projects in the areas, as well as strategic power lines and the Upington MTS.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (24)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. Neutral to negative	Neutral to negative
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operation phase. There will therefore be no irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the identified grid connection corridor.

Residual Impacts:
The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

1.9.2 **Nature:** The development could change the character of the landscape as seen from local homesteads**.**

The ZTV analysis indicates that the collector substations will not be visible from existing homesteads.

The overhead power line however could be visible to homesteads. The potentially affected homesteads are largely located within the Orange River Corridor. Due to the extent of vegetation within this LCA, it is likely that views of the power line will be largely softened / screened. If the power line is visible it will be seen behind an existing high-voltage power line as well as the Upington MTS.

There are also two homesteads on the Plateau to the north west of the N14 from which the proposed power line could be visible, however, these homesteads are located close to the adjacent Sirius Solar PV One project (under construction). One is located within the property on which the Sirius Solar PV One project is under development. It is likely that grid connection infrastructure associated with that project will be more obvious than the proposed Khunab Solar Grid Connection power line.

The grid connection corridor runs within 2.9km of the closest homestead. At this distance the overhead power line is unlikely to be visually obvious.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small to Minor (1)	Small to Minor (1)
Probability	Improbable (1)	Improbable (1)
Significance	**Low (7)**	**Low (7)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. Neutral to negative	Neutral to negative
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	

Mitigation:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- Ensure that vegetation is not unnecessarily removed during the construction period.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
- Align the power line as far from identified receptors as possible within the grid connection corridor.

Residual Impacts:

The residual risk relates to the grid connection infrastructure being left in place on decommissioning of the associated solar projects. It is therefore critical that effective rehabilitation is undertaken.

Nature: The development could change the character of the landscape as seen from local settlement areas.

All local settlements are located close to or within the Orange River Corridor. The ZTV analysis indicates that the collector substations will not be visible from settlements located within the surrounding areas.

The closest settlement is located approximately 1.4km from the eastern end of the grid connection corridor. It is likely that a power line developed in the corridor will be visible from this settlement. However, the new power line will be viewed through other existing electrical infrastructure including an existing high-voltage power line as well as the Upington MTS.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Small to Minor (1)	Small to Minor (1)
Probability	Improbable (1)	Improbable (1)
Significance	**Low (7)**	**Low (7)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. Neutral to negative	Neutral to negative
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the identified corridor.

Residual Impacts:
No residual risks.

Nature: The potential visual impact of operational, safety and security lighting of the grid connection infrastructure at night on observers.

Only the collector substations will be lit. This could result in the substations being obvious at night from surrounding areas.

The Khi Solar One project approximately 4.5km to the south appears relatively dark at night. There are obvious lights from Upington, from the Upington MTS as well as from passing traffic and small settlements and homesteads particularly in the Orange River Valley. The area therefore is not completely dark during the night.

There is potential for the project to add to these existing lighting levels.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Small to minor (1)
Probability	Definite (5)	Improbable (2)
Significance	**Medium (50)**	**Low (12)**
Status	The appearance of a lit area may be accepted by most people. It is likely however that some people will	If the lights are generally not visible then the occasional light is unlikely to be

	see the expansion of lighting as a negative impact.	seen as negative. The status will therefore be neutral.
Irreplaceable loss	It would be possible to change or adapt the lighting / camera system so the impact cannot be seen as an irreplaceable loss.	No irreplaceable loss
Reversibility	High	High
Can impacts be mitigated?	Yes	
Mitigation: » Use low key lighting around buildings and operational areas that is triggered only when people are present. » Utilise infra-red security systems or motion sensor triggered security lighting. » Ensure that lighting is focused on the development with no light spillage outside the site. » Ensure that flood lighting for night time repair work is on a separate circuit and is turned off when not required. » Keep lighting low, no tall mast lighting should be used.		
Residual Impacts: No residual risk has been identified.		

The impacts considered and assessed for construction will be similar in impact and significance for the decommissioning phase.

8.7.4 Implications for Project Implementation

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

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

8.8. Assessment of Social Impacts

Potential social impacts and the relative significance of the impacts associated with the development of the grid connection infrastructure are summarised below (refer to **Appendix J** for more details). The social impact assessment assessed the entire extent of the grid connection corridor, as well as the grid connection infrastructure, including the two collector substations and 132kV power line.

8.8.1 Results of the Social Impact Assessment

Construction phase

The majority of social impacts associated with the project are anticipated to occur during the construction phase of development and are typical of the type of social impacts generally associated with construction activities. These impacts will be temporary and short-term (~12 months) but could have long-term effects on the surrounding social environment if not planned or managed appropriately. It is therefore necessary that the detailed design phase be conducted in such a manner so as to not result in permanent social impacts associated with the ill-placement of project components or associated infrastructure or result in the mismanagement of the construction phase activities.

The positive and negative social impacts identified and assessed for the construction phase includes:

- Direct and indirect employment opportunities
- Economic multiplier effects
- Influx of jobseekers and change in population
- Safety and security impacts
- Impacts on daily living and movement patterns
- Nuisance impacts, including noise and dust
- Visual impacts and sense of place impacts

Operation Phase

As the Khunab Solar Grid Connection is proposed for the Khunab Solar Development, it is anticipated that the grid connection infrastructure will operate for a minimum of 20 years and continuously, 7 days a week. While the grid connection infrastructure will be largely self-sufficient, monitoring periodic maintenance activities will be required during the operation phase.

It must be noted that the ownership of the grid connection infrastructure will be transferred to Eskom following completion of construction, who will be responsible for the operation and maintenance of the infrastructure.

The potential positive and negative social impacts that could arise as a result of the operation of the proposed project include the following:

- Direct and indirect employment opportunities
- Visual impact and sense of place impacts
- Impacts associated with the loss of agricultural land

8.8.2 Description of Social Impacts

The significance of the positive impacts expected during the construction phase will be of a medium significance with the implementation of the recommenced enhancement measures. The positive impacts will however only be temporary and is expected to have a very short duration. This is also true for the social impacts expected during the decommissioning phase of the grid connection infrastructure.

The potential positive and negative impacts that could arise as a result of the construction phase include the following:

» Direct and indirect employment opportunities
» Economic multiplier effects
» Influx of jobseekers and change in population
» Safety and security impacts
» Impacts on daily living and movement patterns
» Nuisance impacts, including noise and dust
» Visual impacts and sense of place impacts

The potential positive and negative social impacts that could arise as a result of the operation of the proposed project include the following:

» Direct and indirect employment opportunities
» Visual impact and sense of place impacts
» Impacts associated with the loss of agricultural land

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

Construction Phase Impacts

Nature: The creation of direct and indirect employment opportunities during the construction phase of the project.

It is anticipated that development of the grid connection infrastructure will result in the creation of approximately 110 employment opportunities at the peak of construction, comprising a mixture of highly skilled (5%), skilled (15%) and semi-skilled and unskilled (90%) positions. Employment opportunities generated as a result of the project will be temporary in nature and **will last for the duration of the construction period (i.e. ~12 months). The general labour force will, as far as possible, be sourced from the local labour pool. Where relevant skills are unavailable from the local labour pool, these would need to be sought elsewhere. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.**

A number of indirect employment opportunities will also be created. Indirect employment opportunities will predominantly be created in the service industry, through the opportunity for the provision of secondary services to the construction team. Services may include, but are not limited to, accommodation, catering, and laundry services.

	Without enhancement	**With enhancement**
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	Minor (2)	Low (2)
Probability	Highly probable (4)	Definite (5)
Significance	**Low (24)**	**Medium (30)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhanced)	

Enhancement:

» A local employment policy should be adopted to maximise opportunities made available to the local labour force.

- » Labour should be sourced from the local labour pool where possible. If the necessary skills are unavailable, labour should be sourced from (in order of preference) the greater Kai !Garib LM, Dawid Kruiper LM, ZF Mgcawu DM, Northern Cape Province, South Africa, or elsewhere. Where required, training and skills development programmes should be initiated prior to the commencement of the construction phase.
- » Labour force suppliers should as far as possible be sourced locally.
- » Where feasible local suppliers and contractors, that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria, should be used as far as possible to ensure that the benefits resulting from the project accrue as far as possible to the local communities which are also likely to be most significantly impacted / affected by the project.
- » The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- » Proof of skills development must be provided to the upskilled individual.

Residual impacts:

- » Improved pool of skills and experience in the local area.
- » Economic growth for small-scale entrepreneurs.

Nature: Significance of the impact from the economic multiplier effects from the use of local goods and services.

There are likely to be opportunities for local businesses and service providers to provide services and materials for, and in doing so benefit from, the construction phase of the Khunab Solar Grid Connection. Off-site accommodation in the nearest towns (Keimoes or Upington) may be required for contract workers and certain employees. The economic multiplier effects from the use of local goods and services will include, but is not limited to, construction materials and equipment, and workforce essentials such as catering, trade clothing, safety equipment, accommodation, transportation and other goods.

In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. The increase in demand for new materials and services in the nearby area may stimulate local business and local economic development. There is likely to be a direct increase in industry and indirect increase in secondary businesses.

	Without enhancement	**With enhancement**
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	Minor (2)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Low (24)**	**Medium (32)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhanced)	

Enhancement:

- » A local procurement policy should be adopted to maximise the benefit to the local economy and the existing local SMMEs.
- » A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g. construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable.
- » Local procurement must be encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.

Residual impacts:

» Improved local service sector and growth in local business.

Nature: In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure.

An influx of people looking for employment or other economic opportunities could result in increased pressure being placed on economic and social infrastructure, and a change in the local population. Population change refers to the size, structure, density as well as demographic profile of the local community.

An influx of jobseekers into an area, could lead to a temporary increase in the level of crime, cause social disruption and put pressure on basic services. It could also potentially create conflict between locals and outsiders due to potential differences in racial, cultural and ethnic composition. A further negative impact that could result due to an influx of jobseekers into an area is an increase in unemployment levels due to an oversupply of available workforce, particularly with respect to semi- and unskilled workers.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Small (0)	Small (0)
Probability	Probable (3)	Improbable (2)
Significance	**Low (9)**	**Low (6)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

» Develop and implement a recruitment protocol in consultation with the municipality and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.
» Develop and implement a local procurement policy which prioritizes "locals first" to prevent the movement of people into the area in search of work.
» Engage with local community representatives prior to construction to facilitate the adoption of the local's first procurement policy.
» Provide transportation for workers (from towns such as Keimoes and Upington) to ensure workers can easily access their place of employment and do not need to move closer to the project site.
» Compile and implement a grievance mechanism.
» Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.
» Prevent the recruitment of workers at the construction site.
» Implement a method of communication whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
» Establish clear rules and regulations for access to the construction site.
» Appoint a security company and implement appropriate security procedures to ensure that workers to not remain onsite after working hours.
» Inform local community organisations and policing forums of construction activities and times and the duration of the construction phase.

Residual impacts:

» Possibility of outside workers remaining in the area after construction is completed and subsequent pressures on local infrastructure, resources and services.

Nature: Temporary increase in safety and security concerns associated with the influx of people during the construction phase.

The commencement of construction activities can be associated with an increase in crime within an area. The perceived loss of security during the construction phase of a project due to an influx of workers and / or outsiders to the area (as in-migration of newcomers, construction workers or jobseekers are usually associated with an increase in crime), may have indirect effects such as increased safety and security concerns for neighbouring properties, damage to property, increased risk of veld fire, stock theft, poaching, crime and so forth.

The labour force will not permanently reside within the construction site.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

- Working hours should be kept within daylight hours during the construction phase.
- Employees should be easily identifiable and must adhere to the security rules of the construction site.
- Provide transportation for workers (from towns such as Keimoes and Upington) to ensure workers do not need to move closer to the construction site.
- The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period.
- The appointed EPC contractor must appoint a security company and ensure appropriate security procedures and measures are implemented.
- Access in and out of the construction site should be strictly controlled by a security company appointed for the project.
- A CLO should be appointed, and a grievance mechanism implemented. A communication protocol should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
- The implementation of a stakeholder management plan by the EPC contractor to address neighbouring landowner concerns regarding safety and security.

Residual impacts:

- None anticipated.

Nature: Temporary increase in traffic disruptions and movement patterns during the construction phase.

Project components and equipment will be transported using road transport. The N14 national road provides the primary access to the area, while the corridor itself can be accessed via the Lutzputs Road (gravel in nature) from the N14. Local farmers utilise the gravel access roads to access their farms.

Increased traffic due to construction vehicles could cause disruptions to the local community and increase safety hazards. The use of local roads and transport systems may cause road deterioration and congestion. This impact will be magnified since farm roads are not designed to carry heavy traffic and are prone to erosion. Noise, vibrations, dust and visual pollution from heavy vehicle traffic during the construction phase could also negatively impact local residents and road users.

	Without mitigation	**With mitigation**
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

» Working hours must preferably be restricted to daylight hours during the construction phase. Where deviation of the working hours is required it must be approved by the relevant local authorities and surrounding landowners must be notified.
» All vehicles must be road worthy and drivers must be licensed, obey traffic rules, follow speed limits and made aware of the potential road safety issues.
» Construction vehicles should be inspected regularly by the EPC contractor to ensure their road worthiness.
» Adequate and strategically placed traffic warning signs and control measures must be placed along the N14, the Lutzputs Road and gravel farm access roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be visible at all times, and especially at night and must be maintained throughout the construction phase.
» Implement penalties for reckless driving as a way to enforce compliance to traffic rules.
» Avoid heavy vehicle activity through residential areas during "peak" hours (when children are taken to school, people driving to work, etc.).
» The developer and EPC contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed or damaged due to construction activities.
» The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if damaged (i.e. wear and tear) due to construction activities.
» A protocol communication must be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
» Undertake information sessions with the surrounding communities prior to construction in order to ensure that communities are fully informed of the project to be developed in its final form. This must be undertaken through the appointment of a Community Liaison Officer (CLO).

Residual impacts:

» None anticipated.

Nature: <u>Nuisance impacts in terms of temporary increase in noise and dust.</u>

Nuisance impacts associated with construction related activities include noise, dust, and possible disruption to adjacent properties. Site clearing activities increase the risk of dust and noise being generated, which can in turn negatively impact on adjacent properties. The movement of heavy construction vehicles and construction activities and equipment also have the potential to create noise, as well as along the N14 national road, and gravel access roads. The primary sources of noise during construction would be from construction equipment, vehicle and truck traffic. Noise levels can be audible over a large distance although are generally short in duration. Dust would be generated from construction activities as well as trucks / vehicles driving on gravel access roads. This impact will negatively impact sensitive receptors. The impact of noise and dust on sensitive receptors can be reduced through the application of appropriate mitigation measures.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)

Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (36)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

» The movement of heavy vehicles associated with the construction phase through populated areas should be timed to avoid weekends, public holidays and holiday periods, where feasible.
» Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
» A speed limit of 40km/hr should be implemented on gravel roads.
» Ensure all vehicles are road worthy, drivers are licensed and are made aware of the potential noise and dust issues.
» A CLO should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
» A stakeholder management plan must be implemented by the EPC contractor to address neighbouring farmer concerns regarding safety and security.

Residual impacts:

» Residual damage from construction activities.

Nature: Intrusion impacts from construction activities will have an impact on the area's "sense of place".

Intrusion impacts such as aesthetic pollution (i.e. building materials, construction vehicles, etc.), noise and light pollution will impact the "sense of place" for the local community. Construction related activities have the potential to negatively impact a local area's "sense of place". Such an impact is likely to be present during the construction phase. It is however expected that the grid connection infrastructure will only affect areas and receptors that have already been exposed to other existing grid connection infrastructure and other industrial infrastructure (i.e. for which the sense of place has already been altered).

Given the location of corridor within an area characterised as having a low population density, and given the project's location within close proximity to operational and visible grid infrastructure and other industrial developments (such as solar facilities), the visual impact and impact on the area's sense of place, from a social perspective, associated with the construction of the proposed project is anticipated to be of a very limited significance.

The identification of the significance of the impact on sense of place for the construction phase was undertaken through the consideration of the Landscape and Visual Impact Assessment (Environmental Planning and Design, 2019) undertaken for the project.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Minor (2)	Small (0)
Probability	Improbable (2)	Very improbable (1)
Significance	**Low (8)**	**Low (2)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

- Limit noise generating activities to daylight working hours and avoid weekends and public holidays.
- The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays and holiday periods where feasible.
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- All vehicles must be road-worthy, and drivers must be licensed and made aware of the potential road safety issues and need for strict speed limits.
- Communication, complaints and grievance channels must be implemented, and contact details of the CLO must be provided to the relevant local communities.
- Ensure proper management and tidiness of the construction site.
- Implement the relevant mitigation measures as recommended in the Visual Impact Assessment.

Residual impacts:

- None anticipated.

Operation Phase Impacts

Nature: The creation of employment opportunities and skills development opportunities during the operation phase

During the operation phase, it is expected that very limited employment opportunities will be available to Eskom Employees as the maintenance will be undertaken by Eskom and according to scheduled and preventative maintenance regimes. These opportunities will be available for limited periods of time, during this phase of the Khunab Solar Grid Connection which will have a negligible positive impact to the area.

	Without enhancement	**With enhancement**
Extent	Local (1)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	Small (0)	Small (0)
Probability	Probable (3)	Probable (3)
Significance	**Low (9)**	**Low (9)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No enhancement is relevant as Eskom employees will be utilised for the maintenance of the grid connection infrastructure.	

Enhancement:
None

Residual impacts:
None

Nature: Visual impacts and sense of place impacts associated with the operation phase of the Khunab Solar Grid Connection.

An area's sense of place is created through the interaction of various characteristics of the environment, including atmosphere, visual resources, aesthetics, climate, lifestyle, culture, and heritage. An area's sense of place is however subjective and largely dependent on the demographics of the population residing within the area and their perceptions regarding trade-offs. For example, while some individuals may prefer not to see any form of infrastructure development, others may be interested in large-scale infrastructure, or engineering projects, and operation of the facility, and consider the impact to be less significant. Such a scenario may especially be true given that the project

comprises a renewable energy project and **could therefore be seen as benefitting the local environment, when compared to non-renewable energy generation projects.**

Given the location of corridor within an area characterised as having a low population density, and given the project's location within close proximity to the operational and visible grid infrastructure and other industrial developments (i.e. solar facilities), the visual impact and impact on the area's sense of place associated with the construction of the proposed project, from a social perspective, is anticipated to be of a very limited significance.

The identification of the significance of the impact on sense of place was undertaken through the consideration of the Landscape and Visual Impact Assessment (Appendix I) undertaken for the project.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Small (0)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (14)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

» Maintain and manage the grid connection infrastructure to be in a good and neat condition to ensure that no degradation of the area and associated infrastructure servitudes takes place and impact the visual quality of the area.
» Implement the relevant mitigation measures as recommended in the Visual Impact Assessment for the change in character and sense of place of the landscape setting.

Residual impacts:

» The visual impact of the grid infrastructure will remain until the infrastructure is completely decommissioned and removed. Thereafter the impact will be removed.

Nature: Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property.

Land capability is defined as "the extent to which land can meet the needs of one or more uses under defined conditions of management". The grid connection corridor proposed for the development of the Khunab Solar Grid Connection has a Low to Very-Low land capability which indicates that the area is only suitable for animal grazing and no dryland crop production.

The grazing capacity of the veld is 30 to 40 hectares per large animal unit or large stock unit. When this is converted to small stock units (8 to 10 hectares per small stock unit), it indicates that the area proposed for the project can support 39 to 48 head of sheep for grazing purposes. Sheep farming is a viable long-term land use of the site permitting that the current crippling drought conditions ceases and as long as the field quality is maintained by never exceeding the grazing capacity.

From an agricultural potential perspective, **the grid connection corridor has limited to no suitability for rainfed crop production.**

Considering the land capability and agricultural potential of the grid connection corridor, the significance of the impact on the loss of agricultural land will be low, before the implementation of mitigation, from a social perspective.

The Soils, Land Use, Land Capability and Agricultural Potential Impact Assessment (Appendix G) undertaken for the project was considered for the identification of the significance relating to the impact on loss of agricultural land.		
	Without mitigation	**With mitigation**
Extent	Site (1)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Small (0)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (14)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation: » Keep the project footprint as small as possible. » Implement mitigation measures recommended by the soil specialist.		
Residual impacts: » None expected to occur.		

The impacts considered and assessed for construction will be similar in impact and significance for the decommissioning phase.

8.8.4 Implications for Project Implementation

The significance of the positive and negative impacts associated with the social aspects that will be affected by the development of the grid connection infrastructure ranges from medium to low with the implementation of the enhancement measures recommended. No negative impacts of a high significance are expected to occur. These implications for the development of the grid connection infrastructure include:

» Local Small and Medium Enterprises should be approached to investigate the opportunities for supplying inputs required for the construction of the 132kV power line and two collector substations, as far as feasible
» Establish a local skills desk to identify the skills set of the local residents available for the construction of the grid connection infrastructure.
» The movement of heavy vehicles associated with the construction phase through populated areas should be timed to avoid weekends, public holidays and holiday periods, where feasible.

8.9. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing the grid connection infrastructure for the Khunab Solar Development. Should this alternative be selected, there would be no environmental impacts within the grid connection corridor due to the construction and operation activities of grid connection infrastructure. The implementation of the 'do-nothing' alternative will result in the solar PV facilities not being able to evacuate the generated electricity to the national grid and will, therefore, render the development of the associated solar PV facilities and the operation thereof not feasible.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government due to competition in the sector, and the number of renewable energy projects being bid to the Department of Energy. In addition, the Northern Cape Province will not benefit from additional generated power being evacuated through the proposed grid connection infrastructure directly into the Province's grid. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws or impacts of a high significance were identified to be associated with the development of the grid connection infrastructure. All impacts associated with the project can be mitigated to acceptable levels. If the grid connection infrastructure is not developed the following impacts will not be realised, which are also associated with the larger Khunab Solar Development project:

a) Land use and agriculture

There are no high potential soils present within the development area and the soils are of moderate potential at best due mainly to a combination of the shallow depth and the sandy texture which will lead to rapid water infiltration and the soils drying out. In addition, the low rainfall in the area means that there is little potential for rain-fed arable agriculture in the area. Arable production would, therefore, be possible only by irrigation, and no indications of any irrigated areas within, and surrounding the development area, can be identified. Irrigation infrastructure is only available close to the Orange River

The implementation of the 'do-nothing' alternative would leave the land-use restricted to the current land use (i.e. grazing), losing out on the opportunity to generate renewable energy including the grid connection in addition to current land use activities. Therefore, from a land-use perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of a viable and compatible land use for the broader study area which allows the current land-use activities to continue.

b) Socio-economic impact

Social: The impacts of pursuing the no-go alternative are both positive and negative as follows:

- The benefits would be that there is no disruption from an influx of jobseekers into the Upington area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- There agricultural potential of the broader study area is low, with no irrigation infrastructure present; therefore, the no-go option would be a lost opportunity for area to be used for an appropriate land use as a result of the solar resource availability over the area. Should the no-go option be considered, the low agricultural potential of the area will remain due to no irrigation infrastructure being present to warrant for the undertaking of commercial farming practices and the area having a low land capability.
- The main and current land use of the affected property is the undertaking of grazing activities which is not considered to be a effective and offers limited benefit and income to the landowner, Khi CSP South Africa (Pty) Ltd, a renewable energy developer who purchased the property for the development of renewable energy facilities. Should the no-go option be considered and implemented the landowner will lose an opportunity to develop and implement a land use that will be more suited to the land and area and beneficial to the landowner based on the grazing capacity of the property.
- There would be an opportunity lost in terms of job creation, skills development and associated economic business opportunities for the local economy, as well as a loss of the opportunity to generate energy

from a renewable resource without creating detrimental effects on the environment. The impact is negative.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited. Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of socio-economic benefits, when considering the current socio-economic conditions of the area.

Skills development: The establishment of the Khunab Solar Grid Connection will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various PV facilities inclusive of grid connection infrastructure are proposed to be developed in the area, which is demarcated as a REDZ, and in the Northern Cape Province, which means that the transfer of skills from foreign experts to the local engineers and construction workers will take place, similar to what has taken place where PV facilities have been constructed and operated within the Province and the rest of the country. The skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

As detailed above, the 'do-nothing' alternative will result in lost opportunities in terms of positive impacts as well as the loss of the opportunity to develop the larger Khunab Solar Development. The negative impacts associated with the 'do nothing' alternative is considered to outweigh the positive impacts of this alternative. The 'do nothing' alternative is, therefore, not preferred and not proposed (or recommended) to be implemented for the Khunab Solar Grid connection.

CHAPTER 9: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 8, the development of the grid connection infrastructure may have effects (positive and negative) on natural resources, the social environment and on the people living in a project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with the grid connection infrastructure for Khunab Solar Development largely in isolation (from other similar developments).

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

The grid connection corridor is proposed within the Northern Strategic Transmission Corridor and the Upington Renewable Energy Development Zone (REDZ 7). The location of the grid connection corridor is in close proximity to a number of other proposed, approved, and operational grid connection infrastructure, which in some cases is associated infrastructure for other renewable energy developments within the area.

Existing grid connection infrastructure located within the surrounding area of the corridor includes the existing Oasis Oranje 132kV power line located to the south-east, which is crossed by the grid connection corridor proposed for the development of the grid connection infrastructure. The Klipkraal Upington 2 132kV power line is located on the north eastern boundary of Olyvenhouts Drift Settlement Agricultural Holding 1080 which connects to the Klipkraal Substation located within the said property. This infrastructure is located more than 5km from the grid connection corridor. The existing Upington Main Transmission Substation (MTS) is located within the south-eastern portion of the corridor and is the preferred grid connection point to connect the four solar energy facilities to the national grid.

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

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

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

9.2. Approach taken to Assess Cumulative Impacts

The cumulative impacts of the proposed Khunab Solar Grid Connection have been assessed through the consideration of other grid connection infrastructure located within the vicinity of the grid connection corridor. Existing grid infrastructure associated with the national grid and existing renewable energy projects are considered as part of this cumulative impact assessment.

- Unacceptable loss of threatened or protected vegetation types, habitat or species through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning;
- Unacceptable risk to water features through disturbance associated with construction activities and increased runoff and erosion during the operation phase;
- Unacceptable risk to avifauna through disturbance and collision with the power line;
- Unacceptable loss of high agricultural potential areas presenting a risk to food security and increased soil erosion;
- Unacceptable loss of heritage resources (including palaeontological and archaeological resources);
- Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion; and
- Unacceptable impact to social factors and components.

It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by grid connection infrastructure development throughout South Africa, while the significance of the cumulative impact on visual amenity may only be influenced by grid connection infrastructure developments that are in close proximity to each other and in close proximity to the viewer.

The grid connection corridor assessed for the grid connection infrastructure is located within a Renewable Energy Development Zone (REDZ) (i.e. the Upington REDZ), and a Strategic Transmission Corridor (i.e. the Northern Transmission Corridor). These areas form part of the areas identified by the DEA as geographical areas of strategic importance for the development of commercial renewable energy developments (REDZ) and large-scale grid infrastructure development projects (transmission corridors). Therefore, these areas are considered as nodes for the development of renewable energy and grid infrastructure projects.

Figure 9.1 indicates the location of other known and viable (proposed, approved and operational) associated grid connection infrastructure related to solar PV facilities, as well as existing grid infrastructure located within the vicinity of the proposed project. The renewable projects located within the surrounding area were identified using the Department of Environmental Affairs Renewable Energy Database and current knowledge of projects being proposed in the area. Details of these solar projects are provided in **Table 9.1.** All projects being considered have received approval from the Department of Environmental Affairs[28]. The potential for cumulative impacts is summarised in the sections that follow and has been considered within the specialist studies (refer to **Appendices D – J**).

The below renewable energy projects provide an indication of the concentration of development within the areas surrounding the grid connection corridor. It is assumed that each of the listed projects, which are

[28] Applications for Environmental Authorisation for numerous grid connection and renewable energy projects have been undertaken within the area, however some of these applications have lapsed and are no longer considered to be valid and are therefore not considered as part of the cumulative impact assessment.

proposed, may (if developed) include the development of grid connection infrstrucutre. However due to a lack of confirmed information regarding proposed development and the associated grid infrastructure only existing grid infrastructure is assessed as part of the cumulative assessment.

Table 9.1: Solar energy projects / developments proposed, approved and operational within proximity of the Khunab Solar Grid Connection and the Khunab Solar Development.

Project Status	Project Name	DEA Reference Number(s)	Location
Operation	Khi Solar One (1 x 50MW CSP)	12/12/20/1831	Portion 03 of the Farm McTaggarts Camp No. 453 – located immediately south west of the development area.
	Upington Airport Solar PV (1 x 8.9MW PV)	12/12/20/2146	Erf 6013 Upington – located to the north-east of the development area.
Under construction – Preferred Bidder Projects	Sirius Solar PV Project One (1 x 75MW PV)	14/12/16/3/3/2/469	Remaining Extent of the Farm Tungsten Lodge No. 638 – located south east of the development area.
	Dyasons Klip 1 (1 x 75MW)	14/12/16/3/3/2/538/1	Remainder of the Farm Dyason's klip No. 454 – south-west of the development area.
	Dyasons Klip 2 (1 x 75MW)	14/12/16/3/3/2/538/2	Remainder of the Farm Dyason's klip No. 454 – south-west of the development area.
Environmental Authorisation Issued	Sirius Solar PV Project Two (1 x 75MW PV)	14/12/16/3/3/2/470	Remaining Extent of the Farm Tungsten Lodge No. 638 – located south-east of the development area.
	Kai Garib (1 x 125MW CSP)	14/12/16/3/3/2/656	Portion 03 of the Farm McTaggart's Camp No. 435 – located immediately to the south of the study area
	Bloemsmond Solar 1 (1 x 75MW PV)	14/12/16/3/3/2/815	Portions 5 and 14 of the Farm Bloemsmond No. 455 – located to the south-west of the development area.
	Bloemsmond Solar 2 (1 x 75MW PV)	14/12/16/3/3/2/816	Portions 5 and 14 of the Farm Bloemsmond No. 455 – located to the south-west of the development area.
	Rooipunt (1 x 150MW CSP)	14/12/16/3/3/1/427	Farm McTaggarts Camp No. 435 – located directly to the north-west of the development area.
	Solis Power I (1 x 150MW CSP)	14/12/20/16/3/3/3/82	Portion 443 to 450 of the Farm Van Rooys Vlei – located to the north-west of the development area.
	Solis Power II (1 x 125MW CSP)	14/12/16/3/3/2/621	Portion 443 to 450 of the Farm Van Rooys Vlei – located to the north-west of the development area.
	Allepad PV1 (1 x 100MW)	14/12/16/3/3/2/1105	Erf 5315 and Erf 01 Upington - located north-east of the development area.
	Allepad PV2 (1 x 100MW)	14/12/16/3/3/2/1106	Erf 5315 and Erf 01 Upington - located north-east of the development area.
	Allepad PV3 (1 x 100MW)	14/12/16/3/3/2/1107	Erf 5315 and Erf 01 Upington - located north-east of the development area.

Project Status	Project Name	DEA Reference Number(s)	Location
	Allepad PV4 (1 x 100MW)	14/12/16/3/3/2/1108	Erf 5315 and Erf 01 Upington - located north-east of the development area.
In process	Sirius Solar PV Project Three (1 x 100MW PV)	14/12/16/3/3/1/2074	Remaining Extent of the Farm Tungsten Lodge No. 638 – located south-east of the development area.
	Sirius Solar PV Project Four (1 x 100MW PV)	14/12/16/3/3/1/2075	Remaining Extent of the Farm Tungsten Lodge No. 638 – located south-east of the development area.

It should be noted that not all the renewable energy projects and associated grid infrastructure projects presently under consideration by various developers will be built for operation. Not all proposed developments will be granted the relevant permits by the relevant authorities (DEA, DOE, NERSA and Eskom).

The cumulative impacts of the other known existing grid infrastructure and the proposed Khunab Solar Grid Connection are qualitatively assessed in this Chapter. The following potential impacts are considered:

- Cumulative impacts on ecological processes
- Cumulative impacts on avifauna
- Cumulative impacts on soil and agricultural potential
- Cumulative impacts on heritage resources
- Cumulative visual impacts
- Cumulative social impacts

In the sections below the potential for cumulative impacts resulting from existing grid connection infrastructure within close vicinity of the assessed grid connection corridor are explored. **Figure 9.1** illustrates the existing powerlines and substations within the vicinity of the Khunab Solar Grid Connection.

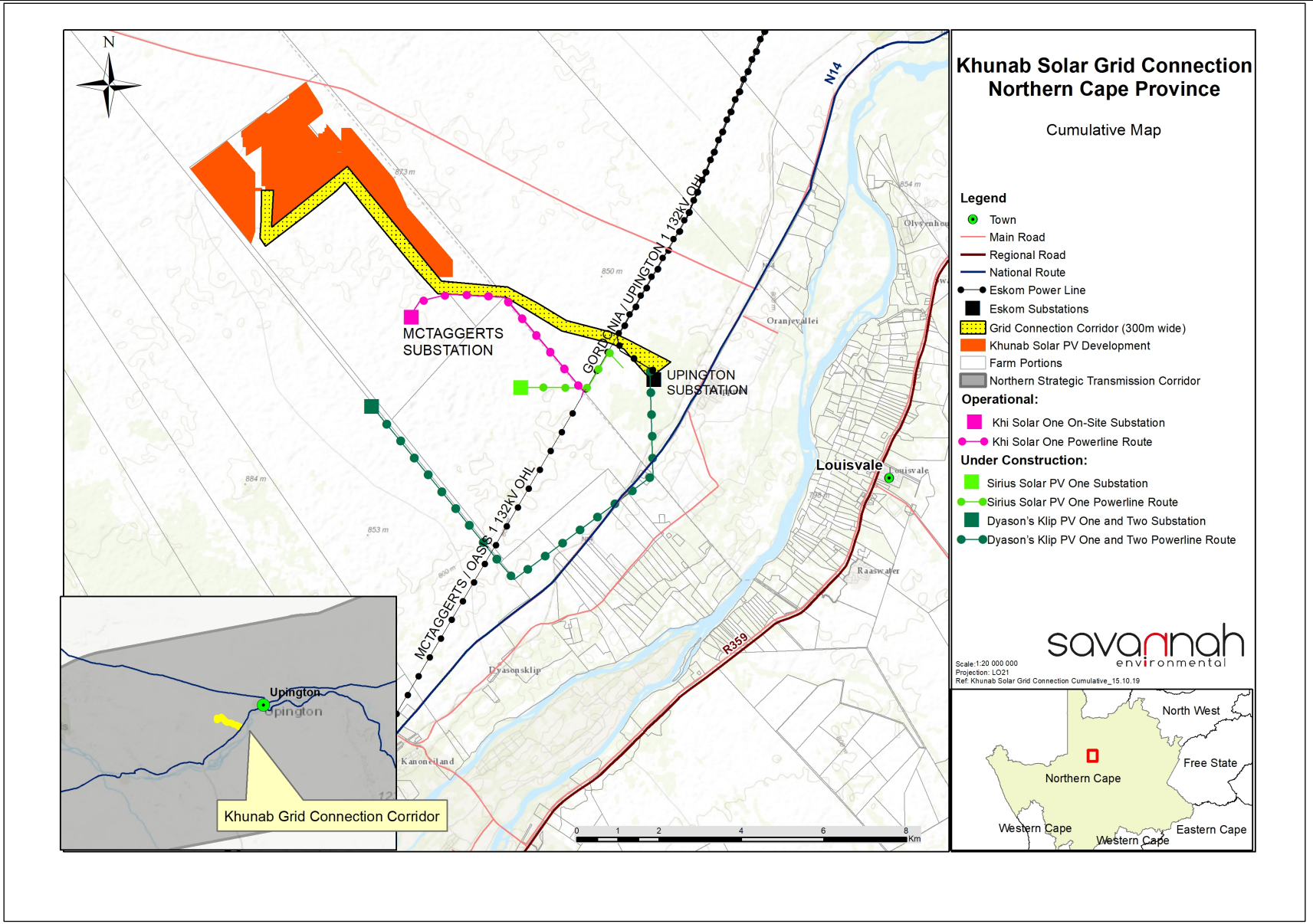

Figure 9.1: Cumulative map for the Khunab Solar Grid Connection

9.3. Cumulative Impacts on Ecological Processes

From an ecological perspective, and considering the area, the main cumulative impact will be habitat loss and an impact on the ecological functioning of the area due to the development of grid connection infrastructure associated with numerous solar energy facilities within the area. The impacts will occur due to the construction and operation of the solar energy facilities.

The development of the grid connection infrastructure for the Khunab Solar Development will result in approximately 10ha of habitat loss and fragmentation of the receiving environment. In addition, there are two other planned solar facilities (Dyasons Klip solar PV projects and Sirius solar PV projects) in the broader study are with associated grid connections. Although each may generate an acceptable, low impact when considered alone, this does not account for the potential for cumulative impacts to generate significant impacts on fauna and flora as well as future conservation-use options for the wider area. With and without mitigation, this impact is likely to be of a low significance.

A letter was provided by the Aquatics specialist (**Appendix F**) which states that the grid infrastructure can span the sensitive features (Heelbrandleegte River), therefore the development of the proposed grid infrastructure cannot contribute to the cumulative impacts on aquatics.

Nature: The development of Khunab Solar Grid Connection will potentially contribute to cumulative habitat loss and other cumulative impacts in the wider Upington area.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (14)**	**Low (27)**
Status	Negative	Negative
Reversibility	High	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated	To some degree, but the majority of the impact results from the presence of the various facilities and associated grid connection infrastructure which cannot be well mitigated.	
Mitigation: » Ensure that sensitive habitats such as drainage features, pans and quartz patches are not within the development footprint. » Ensure that the fencing around each collector substation is friendly with fauna and avifauna. This includes not having any electrified strands within 30cm of the ground as well as implementing a design that prevents fauna and avifauna from becoming trapped between the inner and out layer of the fence as this has been demonstrated to be a common impact. » Ensure that an alien management plan and erosion management plan are effectively implemented at the site.		

9.4. Cumulative Impacts on Avifauna

Cumulative impacts from an avifauna perspective are those impacts that will affect the general avian communities in and around the grid connection corridor due to the combined cumulative effect of all the

grid infrastructure developments located within the areas. These impacts will be due to collision, avoidance and displacement. The main species of concern from a cumulative perspective are bustards.

The potential for cumulative impacts of solar energy development with the associated grid connection infrastructure in the area is therefore a potential concern. The total estimated direct footprint of the existing approved projects is estimated at as much as 9000ha, should all proposed projects in the area be established. These are largely concentrated within the plain's habitat of the Kalahari Karroid Shrubland and the Gordonia Duneveld vegetation types, which are widespread habitats with relatively low avifaunal diversity. As these vegetation types are rather extensive, the loss of portions of these habitats due to grid connection infrastructure is not significant from a regional perspective. The major concern would be with respect to the impacts on landscape connectivity from a local perspective. The location of the proposed grid connection corridor adjacent to the Khunab Solar Development as well as the presence of an existing power line along the grid connection corridor are certainly mitigating circumstances which would serve to reduce the cumulative impact associated with the proposed development. This will also reduce the potential for collisions with large raptors and terrestrial birds (e.g. bustards) since the grid connection corridor will mostly be traversing adjacent to solar fields. The contribution of the current grid connection corridor is approximately 13km in length is considered relatively low and would result in a low additional contribution to cumulative impact in the area and as such is considered acceptable. The overall avifauna cumulative impact will therefore be of an acceptable medium significance.

Nature: Impact on avifaunal habitats, migration routes and nesting areas due to cumulative loss and fragmentation of habitat, as well collisions and electrocutions along the grid connection corridor.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low to Moderate (5)
Probability	Improbable (2)	Probable (3)
Significance	**Low (18)**	**Medium (33)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated	Impacts can be mitigated to some degree, but the majority of the long-term impact results from the presence of the grid connection infrastructure and other developments in the area which cannot be well mitigated.	
Mitigation: » Initiate increased monitoring along grid connection corridors in the area during periods when numbers of large nomadic species (e.g. Ludwig's Bustard) are highest, to determine any areas along the power lines where there are potentially high collision rates. Such areas must be fitted with bird diverters to reduce collisions rates. » Ensure that suitable avifaunal and ecological corridors within the broader study area are identified and maintained, whereby connectivity between areas of higher conservation value are preserved.		

9.5. Cumulative Impacts on Land Use, Soil and Agricultural Potential

It is expected that there will be a change in the dominant current land use of the area from livestock farming to electricity generation. This is in line with the planning for this area, which falls within the northern corridor of the Strategic Transmission Corridors, as well as a Renewable Energy Development Zone (REDZ). In addition

to this, cumulative impacts will be an increased risk for soil erosion when vegetation is removed and there is possible pollution of soil resources.

Nature: Decrease in areas with suitable land capability for livestock farming. The significance of the project in isolation is considered to be medium and from a cumulative perspective the significance is still considered to be medium however there will be a slight increase in the significance rating.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Moderate (3)
Probability	Probable (4)	Probable (4)
Significance	**Medium (32)**	**Medium (40)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Confidence in findings: High.		
Mitigation: The only mitigation measure for this impact is to keep the footprints of all grid connection infrastructure as small as possible and to manage the soil quality by avoiding far-reaching soil degradation such as erosion.		

Nature: Increase in areas susceptible to soil erosion		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Permanent (5)
Magnitude	Moderate (6)	Moderate (3)
Probability	Probable (3)	Probable (4)
Significance	**Medium (30)**	**Medium (40)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Confidence in findings: High.		
Mitigation: Each of the projects should adhere to the highest standards for soil erosion prevention and management.		

Nature: Increase in areas susceptible to soil pollution		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	High (3)	Regional (2)
Duration	Medium-term (3)	Permanent (5)
Magnitude	Moderate (6)	Moderate (3)
Probability	Probable (3)	Probable (4)
Significance	**Medium (36)**	**Medium (40)**

Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Confidence in findings: High.		
Mitigation: Each of the projects should adhere to the highest standards for soil pollution prevention and management.		

9.6. Cumulative Impacts on Heritage (including archaeology, palaeontology and cultural landscape)

impacts to individual archaeological sites are still neutral after mitigation, if many sites are sampled over multiple renewable energy projects (including the associated grid connection infrastructure) then a positive cumulative impact could be realised because of the advance of scientific knowledge that may result from the mitigation work.

Cumulative Impacts to palaeontology are likely to be of low significance because of the generally sparse distribution of fossils in the broader landscape. With mitigation the significance is reduced because of the positive aspect of rescuing scientific samples and the retrieval of data. Nevertheless, negative impacts will continue to accumulate when numerous projects commence with construction.

Several other solar facilities (including the grid connection infrastructure) have been proposed in the region but clustering of impacts is more desirable than spreading them widely from a cultural landscape perspective. Although cumulative impacts are likely to occur, having them concentrated reduces their significance. Also, the area is a declared REDZ and also falls within the Northern Strategic Transmission Corridor which means that clustering of energy-related developments here will help reduce impacts in other areas and the associated cultural landscapes.

Overall the impacts to all heritage for the proposed grid connection infrastructure alone are considered to be of low significance, while impacts when considering all proposed projects would calculate to a medium significance. While it is impossible to hide the grid connection infrastructure in the landscape, a small degree of mitigation can be effective through the application of best practice measures such as the rehabilitation of disturbed areas not required for the operation phase.

There is the potential for the cumulative impact of the proposed Khunab Solar Grid Connection infrastructure and existing grid infrastructure to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial, however, due to the remoteness of the area the impact on the experience of the cultural landscape is not foreseen to be significant.

Nature: Cumulative impact to the sense of place from a heritage (including archaeology, palaeontology) perspective		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (4)	Local (4)
Duration	Medium-term (3)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (22)**	**Medium (36)**

Status (positive or negative)	Neutral	Neutral
Reversibility	High	Low
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Not Applicable	
Mitigation: No impacts are anticipated and as such, no mitigation is required		

9.7. Cumulative Visual Impacts

The construction of the grid connection infrastructure for the Khunab Solar Grid Connection will increase the cumulative visual impact of industrial type infrastructure within the region. There will also be an impact on the visual quality of the landscape.

The grid connection corridor follows the existing Khi Solar One grid connection power line for part of the alignment. The areas of visual impact associated with the proposed infrastructure are likely to fall within the impact area associated with other projects and particularly the Khi Solar One existing project. Whilst this may intensify local levels of impact it will not extend the impact area of renewable energy and associated grid connection projects.

The anticipated cumulative visual impact of the proposed power line is expected to be of low significance, which is considered to be acceptable from a visual perspective. This is once again due to the relatively low viewer incidence within close proximity to the proposed alignment and the presence of the existing electricity infrastructure.

Nature: *General cumulative change in the character and sense of place of the landscape setting* The collector substations and overhead power line will impact an area that is currently impacted by one major solar project and around which a number of other solar projects are authorised / proposed / under construction. The proposed project will therefore not extend the visual influence of industry, it will however intensify if within a relatively small area. Because the proposed project will affect an area within which there is already significant visual influence of solar projects and their grid connections, it is only likely to have a relatively small contribution to landscape change.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings (2)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	High (8)
Probability	Improbable (2)	Probable (3)
Significance	**Low (12)**	**Medium (45)**
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance	Unknown
Mitigation: » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. » Ensure that vegetation is not unnecessarily removed during the construction period. » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.		

- » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
- » Align the power line as far from roads as possible within the identified corridor.

Nature: The cumulative impact of the proposed power line and collector substations on views from the N14.

Because the proposed project will affect an area within which there is already significant visual influence of solar projects and their grid connections, it is only likely to have a relatively small contribution to landscape change.

The ZTV analysis indicates that the collector substations will not be visible from the N14 and that the power line will be visible from approximately 5.9km of the road and at a minimum distance of less than 2km. However, it will be viewed through other electrical infrastructure including another high-voltage overhead line and the Upington MTS.

The grid connection corridor approaches the road at a right angle which means that the power line will not run along the length of the road and the power line is likely to become less obvious the further the viewer is from the line. Because the proposed project will be seen through other existing infrastructure it will reinforce existing visual impacts.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings (2)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small to minor (1)	Moderate to low (5)
Probability	Improbable (2)	Probable (5)
Significance	**Low (14)**	**Medium (60)**
Status (positive or negative)	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	Unknown

Mitigation:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- » Ensure that vegetation is not unnecessarily removed during the construction period.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
- » Align the power line as far from roads as possible within the identified corridor.

Nature: *Change in the character of the landscape as seen from the R359*

The assessment indicates that the proposed collector substations and overhead power line is highly unlikely to have any visual impact on this road. The cumulative impact on this road will however be of a medium significance.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings (2)	Regional (3)

Duration	Long term (4)	Long term, (4)
Magnitude	Small (0)	Minor to Low, (3)
Probability	Very improbable (1)	Probable, (3)
Significance	**Low (6)**	**Medium (30)**
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	Unknown

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the identified corridor.

Nature: Change in the character of the landscape as seen from the Lutzputs Road.

The assessment indicates that due to distance and the nature of the road the proposed collector substations and the proposed power line will be visible, but the visual impact will have a low significance. From the site visit the impact of existing infrastructure on the Lutzputs Road was assessed as medium. The overall cumulative impact could therefore have a medium significance. The proposed project is likely to result in a relatively low contribution to this overall impact.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings (2)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	**Low (24)**	**Medium (44)**
Status (positive or negative)	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. Neutral to negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	The proposed development can be dismantled and removed at the end of the operation phase. There will therefore be no irreplaceable loss.	No irreplaceable loss
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	Unknown

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.

- » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
- » Align the power line as far from identified receptors as possible within the identified corridor.

Nature: Cumulative impact on local homesteads

Visual impacts of the proposed infrastructure on homesteads were assessed as being low and improbable. The proposed project is therefore unlikely to contribute significantly to cumulative visual impacts on homesteads. Because the majority of homesteads are located within the Orange River Valley and are likely to be at least partially screened the cumulative visual impact is anticipated to be low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings (2)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small to Minor (1)	Minor (2)
Probability	Improbable (1)	Probable (3)
Significance	**Low (7)**	**Low (27)**
Status (positive or negative)	Neutral to negative	Neutral to negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Unknown

Mitigation:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- » Ensure that vegetation is not unnecessarily removed during the construction period.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
- » Align the power line as far from identified receptors as possible within the identified corridor.

Nature: Cumulative impact on Settlement

There are numerous small settlement areas along the N14 and within the Orange River Valley. The likely visual impact of the proposed infrastructure on settlement areas was assessed as having a low significance. Whilst a detailed assessment of other planned projects has not been undertaken, it is possible that they may impact to a small degree on settlement areas.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings (2)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small to Minor (1)	Moderate (6)
Probability	Improbable (1)	Probable (3)
Significance	**Low (7)**	**Medium (39)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. Neutral to negative	Negative

Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, however possible mitigation will not change the level of significance.	Unknown

Mitigation:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- » Ensure that vegetation is not unnecessarily removed during the construction period.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
- » Align power line as far from identified receptors as possible within the identified corridor.

Nature: Cumulative Night-time Lighting Impacts

Currently lighting in the area arises from the settlement areas and homesteads within the Orange River Valley and traffic on the N14. There is also a background lighting level from the urban area of Upington. There is a risk that the proposed collector substations will extend the influence of lighting however with appropriate mitigation lighting levels are anticipated to be low and in keeping with the current lighting pattern.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site (1)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small to minor (1)	Small to minor (1)
Probability	Improbable (2)	Improbable (3)
Significance	**Low (12)**	**Low (24)**
Status (positive or negative)	If the lights are generally not visible, then the occasional light is unlikely to be seen as negative. Neutral	Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	

Mitigation:

- » Use low key lighting around buildings and operational areas that is triggered only when people are present.
- » Utilise infra-red security systems or motion sensor triggered security lighting.
- » Ensure that lighting is focused on the development with no light spillage outside the site.
- » Ensure that flood lighting for night-time repair work is on a separate circuit and is turned off when not required.
- » Keep lighting low, no tall mast lighting must be used.

9.8. Cumulative Social Impacts

Both positive and negative social cumulative impacts are expected with the development of the Khunab Solar Development. The positive impacts relate to employment opportunities, skills development and business opportunities. The negative impacts relate to a change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.

Nature: **An increase in employment opportunities, skills development and business opportunities.**

The Khunab Solar Grid Connection and the establishment of associated grid connection infrastructure for other solar power projects and grid connection infrastructure associated with the national grid within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream/spin-off business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of the Khunab Solar Grid Connection alone.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local- Regional-National (4)	Local- Regional-National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Highly Probable (4)
Significance	**Medium (36)**	**Medium (56)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	N/A	
Can impacts be mitigated?	Yes (enhanced)	
Confidence in findings	High	

Enhancement:

The establishment of grid connection infrastructure projects within the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities. The positive benefits will be enhanced if local employment policies are adopted and local services providers are utilised by the developers to maximise the project opportunities available to the local community.

Residual impacts:

- Improved pool of skills and experience in the local area.
- Improved standard of living through the creation of employment opportunities.
- Economic growth for small-scale entrepreneurs.

Nature: **Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.**

While the development of the Khunab Solar Grid Connection may not result in a major influx of people into the area, the development of several projects at the same time may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within REDZ 7 and within the Northern Strategic Transmission Corridor, which has specifically been earmarked for the development of large scale solar PV energy facilities and grid connection infrastructure, implies that the surrounding area is likely to be subject to considerable future applications and expansion of such infrastructure. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and standards of living.

It is very difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local-Regional (3)
Duration	Long term (4)	Long term (4)

Magnitude	Minor (2)	Low (4)
Probability	Very Improbable (1)	Improbable (2)
Significance	**Low (8)**	**Low (22)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Confidence in findings	High	

Mitigation:

» Develop a recruitment policy / process (to be implemented by contractors), which will source labour locally.
» Work together with government agencies to ensure that service provision is in line with the development needs of the local area.
» Form joint ventures with community organisations, through Trusts, which can provide local communities with benefits, such as employment opportunities and services.
» Develop and implement a recruitment protocol in consultation with the municipality and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.

Residual impacts

» Possibility of outside workers remaining in the area after the construction is completed and the subsequent potential pressures on local infrastructure, services and poverty problems.

9.9. Conclusion regarding Cumulative Impacts

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

All cumulative impacts associated with the Khunab Solar Grid Connection will be of a medium or low significance. A summary of the cumulative impacts is included in **Table 9.2** below.

Table 9.2: Summary of the cumulative impact significance of the grid connection infrastructure within the assessed grid connection corridor

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

The main aim for the assessment of cumulative impacts considering the Khunab Solar Grid Connection is to determine whether the cumulative development will be acceptable within the landscape proposed for the

development, and whether the cumulative loss, from an environmental and social perspective, will be acceptable without whole-scale change. The following can be concluded regarding the cumulative impacts of the grid connection infrastructure:

- ***Ecological processes:*** Cumulative impacts on habitat and ecological functioning will be of a low significance. There will be no unacceptable loss of habitat or impact to ecological functioning due to the development of the project and other grid infrastructure developments within the surrounding area.
- **Avifauna:** Cumulative impacts as a result disturbance, displacement and collision ranges from low to medium significance. There will be no unacceptable risk to avifauna or loss of avifauna species due to the project and other grid infrastructure developments within the surrounding area, subject to the implementation of the recommended mitigation measures.
- **Soils and Agricultural Potential:** Cumulative impacts in terms of soil erosion will be of a medium significance. There will be no unacceptable loss of soil resources or increased soil erosion associated with the development of the project and other grid infrastructure developments within the surrounding area.
- **Heritage (including archaeology, palaeontology and the cultural landscape):** Cumulative impacts on heritage resources relate to direct impacts to heritage resources and the introduction of generally incompatible electrical infrastructure into the landscape. The significance of the cumulative impacts will be low. There will be no unacceptable loss of heritage resources associated with the project and other grid infrastructure developments within the surrounding areas.
- **Visual:** Cumulative visual impacts relate to a change in the visual quality of the landscape. The significance of the visual cumulative impacts will be medium. There will be no unacceptable impact on the visual quality of the landscape associated with the project and other grid infrastructure developments within the surrounding areas.
- **Social:** Both positive and negative social cumulative impacts have been identified. The positive impacts will be negligible and will relate to positive economic impacts and job creation and the negative impacts relate to an increase in crime and an influx of migrant labour and job seekers. There will be no unacceptable risk or impacts to the social aspects and characteristics with the development of the project and other grid infrastructure developments within the surrounding area. The significance of the cumulative impacts will be low or medium (depending on the impact being considered).

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

CHAPTER 10: CONCLUSIONS AND RECOMMENDATIONS

McTaggarts PV1 (Pty) Ltd proposes the construction and operation of a grid connection solution for the proposed McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and Klip Punt PV1 solar PV facilities, collectively known as the Khunab Solar Development, near Upington in the Northern Cape Province. The Khunab Solar grid connection project provides a grid connection solution for the four solar PV facilities to connect to the Upington Main Transmission Substation (MTS), and will include the development of two collector substations (each including a switching station component), as well as a single circuit power line. The collector substations will be known as the Khunab Collector Substation[29] and the Klip Punt Collector Substation[30]. Other associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays, a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.

A corridor 300m wide and 13km long is being assessed to allow for the optimisation of the grid connection infrastructure layout and to accommodate environmental sensitivities. The assessed grid connection corridor is located within the Upington Renewable Energy Development Zone (REDZ), and within the northern corridor of the Strategic Transmission Corridors. The grid infrastructure (including a 132kV power line and two collector substations) will be developed within the assessed 300m wide corridor (known as the grid connection corridor).

The full length of the assessed 300m wide corridor traverses three affected properties, namely:
» Portion 3 of McTaggart's Camp No. 453;
» Portion 12 of Klip Punt 452; and
» Olyvenhouts Drift Settlement Agricultural Holding 1080.

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

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

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

[29] The Khunab Collector Substation (including the switching station component) will facilitate a connection from McTaggarts PV2 and McTaggarts PV3 to the national grid and will be located on Portion 3 of McTaggarts Camp No. 453.

[30] The Klip Punt Collector Substation (including the switching station component) will facilitate a connection from McTaggarts PV1 and Klip Punt PV1 to the national grid and will be located on Portion 3 of McTaggarts Camp 453 and Portion 12 of Klip Punt 452.

Requirement	Relevant Section
3(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	A summary of the findings of the specialist studies undertaken for the grid connection corridor has been included in section 10.2.
3(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	An environmental impact statement containing the key findings of the environmental impacts of the Khunab Solar Grid Connection has been included as section 10.5. An environmental sensitivity and layout map of the grid connection infrastructure has been included as **Figure 10.1** which overlays the assessed grid connection corridor with the sensitive environmental features present within the corridor. A summary of the positive and negative impacts associated with the development of the grid connection infrastructure has been included in section 10.2.
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation for the grid connection infrastructure have been included in section 10.6.
3(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether the grid connection infrastructure associated with the Khunab Solar Grid should be authorised has been included in section 10.6.

10.2. Evaluation of the grid connection infrastructure of the Khunab Solar Grid Connection

The preceding chapters of this report together with the specialist studies contained within **Appendices D-J** provide a detailed assessment of the potential impacts that may result from the development of the Khunab Solar Grid Connection. This chapter concludes the environmental assessment of the development of the grid connection infrastructure within the grid connection corridor by providing a summary of the results and conclusions of the assessment. In doing so, it draws on the information gathered as part of the BA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws or impacts of high significance were identified in the detailed specialist studies conducted, and no impacts of unacceptable significance are expected to occur with the implementation of the recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features as specified by the specialists.

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

- Impacts on ecology, flora and fauna.
- Impacts on avifauna.
- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area as a result of the grid connection infrastructure.
- Social impacts.

1.9.3 10.2.1 Impacts on Ecology (Fauna and Flora)

The Ecological Impact Assessment (**Appendix D**) is based on the findings of two site visits undertaken within two different seasons and assessed the impact of the grid connection infrastructure on the sensitive ecological features present within the grid connection corridor for the lifecycle of the project. The assessment identified impacts within the construction, operation and decommissioning phases of the project.

During the construction, operation and the decommissioning phase the impacts include impacts on vegetation and plant species of conservation concern, faunal impacts and an increased soil erosion risk. The significance of the construction phase and decommissioning phase impacts will be low with the implementation of the mitigation measures recommended by the specialist. The significance of the impacts for the operation phase will be low with the implementation of the mitigation measures recommended by the specialist. No impacts of high significance were identified prior to the implementation of mitigation.

From the findings of the Ecological Impact Assessment it can be concluded that the grid connection corridor assessed for the development of the grid connection infrastructure is of low ecological sensitivity. As a result, there are no specific long-term impacts associated with the grid connection infrastructure that cannot be reduced to an acceptable level through mitigation and avoidance. There are no high residual impacts or fatal flaws associated with the development and it can be supported from a terrestrial ecology perspective. The specialist has indicated that the Khunab Solar Grid Connection should be authorised, from an ecological perspective, and subject to the implementation of the recommended mitigation measures.

1.9.4 10.2.2 Impacts on Avifauna

The Avifauna Impact Assessment (**Appendix E**) is based on the findings of two site visits undertaken within two different seasons and assessed the impacts identified to be associated with the grid connection infrastructure as negative and local in extent. The duration of the impacts will be long-term, for the lifetime of the grid connection infrastructure, for all collision-prone species, however the significance of the impact can be reduced through the implementation of mitigation. The magnitude of the impacts expected with the development of the grid connection infrastructure will be moderate to low, specifically for bustards and raptors. The probability that interaction between the grid connection infrastructure and raptors and bustards will occur is considered to be probable, due to the passage rates and occurrence of the species along the grid connection corridor.

During the construction phase a negative impact on red-listed bird groups is expected to occur, which specifically relates to the avoidance of the area due to human activity, noise and predation threat. The significance of the impact will be medium prior to mitigation but can be reduced to a low significance with the implementation of the recommended appropriate mitigation measures. No impacts of a high significance are expected during the construction phase.

Impacts on avifauna during the operation phase of the grid connection infrastructure will be negative and could include the mortality of birds due to direct impact with the infrastructure and the avoidance of the area due to the presence of the 132kV power line. The nomadic Ludwig's and Kori Bustards are the most likely to be impacted by overhead power lines, while the Secretarybird and possibly other collision-prone raptors may be impacted. The significance of the operation phase impact will be medium with the

implementation of the recommended design mitigation measures for the construction of the 132kV power line. No avifauna impacts of a high significance are expected during the operation phase.

From the results of the avifauna assessment, it can be concluded that with the implementation of the recommended mitigation measures, the risks and mortalities expected with the development of the grid connection infrastructure can be reduced to acceptable levels. No long-term impacts of a high significance are expected, and no fatal flaws were identified from an avifauna perspective. The specialist has indicated that the Khunab Solar Grid Connection should be authorised, and subject to the implementation of the recommended mitigation measures.

1.9.5 10.2.3 Impacts on Soil and Agricultural Potential

The Soils and Agricultural Potential Impact Assessment (**Appendix G**) assessed the impact of the grid connection infrastructure on soil resources within the grid connection corridor for the lifecycle of the project. The identified impacts include soil chemical pollution, loss of potentially productive agricultural land, and increased soil erosion by wind due to disturbance of the soil. These impacts are expected during the construction and operation phases and can be mitigated to be within low and acceptable levels of impact considering the characteristics and potential of the soils present within the grid connection corridor and the lack of productive agricultural land.

No fatal flaws have been identified from a soils and agricultural potential perspective. Therefore, the specialist has indicated that the development of the Khunab Solar Grid Connection is considered to be acceptable from a soils and agricultural perspective.

1.9.6 10.2.4 Impacts on Heritage Resources (including archaeology and palaeontology)

The Heritage Impact Assessment (**Appendix H**) assessed the impact of the grid connection infrastructure on the heritage features (archaeology, palaeontology and cultural landscape). The heritage impacts include impacts to palaeontological resources and archaeological resources (during the construction phase) and impacts to the cultural landscape (during all phases of the project).

Impacts to palaeontological resources would occur only during the construction phase when foundations are excavated, and the service road cleared. The magnitude of the impact would be low since, fluvial and aeolian sands do not preserve fossils; only palaeo-pans might but none has been recorded. Palaeo-channels might contain fossil wood and bones, but none has been recorded within the grid connection corridor. The impact would be very unlikely. As a result of low impacts on palaeontology before mitigation, there are no impacts applicable or expected after mitigation has been implemented.

Palaeontological materials were not observed along the grid connection corridor, but isolated fossil bones could occur within the various sand formations of the area. Possible fossils within the area would be from palaeo-pans or palaeo-channels, if present, and therefore the spatial scale will be localised within the boundary of the grid connection corridor. No other significant impacts are expected.

In terms of the cultural landscape, impacts would be associated with the presence of incompatible features in the landscape (i.e. the 132kV power line and two collector substations) and from the clearing of natural vegetation for the service road and substations.

No fatal flaws have been identified from a heritage perspective. The significance of the impacts will be low, and no recommended mitigation measures are applicable. No heritage impacts of high significance are expected, and the development of the grid connection infrastructure is considered to be acceptable.

1.9.7 10.2.5 Visual Impacts

The Visual Impact Assessment (**Appendix I**) identified negative impacts on visual receptors during the construction and the operation phases of the grid connection infrastructure. The impacts include visual impacts due to construction activities, as well as impacts on sensitive visual receptors located within 0.5km to 3km from the grid connection infrastructure, and a visual impact on the sense of place. The Visual Impact Assessment concluded that the visual impact of the grid connection infrastructure would be most significant within a 3km radius from the infrastructure. The significance of the impacts will, however, be low, with the implementation of the recommended mitigation measures. No impacts of a high significance are expected to occur.

The specialist indicated that the development of the Khunab Solar Grid Connection is supported from a visual perspective, subject to the implementation of the recommended mitigation measures.

10.2.6 Social Impacts

The Social Impact Assessment (**Appendix J**) identified that majority of the social impacts associated with the development of the grid connection infrastructure will have a very short-term duration associated with the construction and decommissioning phases, and long-term duration during the operation phase. Positive and negative impacts have been identified for both the construction and operation phases of the grid connection infrastructure.

During the construction phase the significance of the positive impacts can be enhanced to be of a medium significance and the negative impacts can be enhanced to low significance. The impacts will however be of a very short duration. During the operation phase the significance of the negative impacts will be low with the implementation of the recommended enhancement measures.

Overall, the development of the grid connection infrastructure will be associated with positive and negative social impacts of medium significance during the construction, operation and decommissioning phases. Best practice measures for the project must be implemented in all phases.

The social impacts are considered to be acceptable and negative impacts can be reduced to acceptable levels.

10.2.7 Assessment of Cumulative Impacts

The cumulative impacts of the Khunab Solar Grid Connection and other known grid infrastructure and renewable energy projects in the broader area have been qualitatively assessed. There are eighteen renewable energy developments within the vicinity of the Khunab Solar Grid Connection corridor.

The assessed grid connection corridor is located within a Strategic Transmission Corridor (i.e. the Northern Transmission Corridor, as well as a Renewable Energy Development Zone (REDZ) (i.e. the Upington REDZ). These areas form part of the areas identified by the DEA as geographical areas of strategic importance for

the development of commercial renewable energy developments (REDZ) and large-scale grid infrastructure development projects (power transmission corridors). Therefore, the area is considered to be a node for the development of renewable energy and grid infrastructure.

Table 10.1 provides a summary of the findings of the cumulative impact assessment undertaken by the various specialists (refer to Chapter 9 for more details).

Table 10.1: Summary of the cumulative impact significance of the grid connection infrastructure within the assessed grid connection corridor

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

Based on the specialist cumulative assessment and findings, the development of the grid infrastructure for the Khunab Solar Grid Connection and its contribution to the overall impact of existing grid connection infrastructure within the vicinity of the proposed Khunab Solar Grid Connection, it can be concluded that the contribution of the project to cumulative impacts will range from low significance to medium significance, depending on the impact being considered. There are, however, no identified impacts considered as presenting an unacceptable risk. In addition, no impacts that will result in whole-scale change are expected.

10.2.8 Consideration of Alternatives

Two grid connection corridor alternatives were initially identified by the developer for the development of the Khunab Solar Grid Connection. These alternatives both connect the Khunab Solar Development to the Upington MTS.

Following the consideration of the technical characteristics of each alternative and the infrastructure requirements associated with each alternative the developer discarded Alternative 2 as a technically viable and feasible option for development. The discarding of Alternative 2 is based on the technical challenges in terms of the right angles which are not feasible for power line construction, and the increased length of the power line route, which results in more infrastructure than Alternative 1.

Alternative 1 was, therefore, identified by the developer as the preferred alternative from a technical feasibility perspective and has been fully considered and assessed as part of this BA process and within this BA Report.

Considering the above, no grid connection corridor alternatives were assessed as part of this BA process.

10.3. Environmental Sensitivity of the Assessed Grid Connection Corridor

The 300m wide grid connection corridor is being assessed including the 13kV power line and two collector substations (each with a switching station component) situated within the corridor.

From the specialist investigations undertaken for the grid connection infrastructure, sensitive areas/environmental features have been identified and demarcated within the grid connection corridor. The high sensitivity features would need to be considered by the developer for the location of the grid connection infrastructure within the assessed grid connection corridor. The points below describe the sensitivity of the features as identified and mapped in **Figure 10.1. Figure 10.2** provides a sensitivity map of the development area overlain with the development footprint.

The environmental features identified in **Figure 10.1** within the grid connection corridor include:

- In the northern section of the corridor the following features are present namely: poorly developed drainage lines and drainage lines.
- The southern section of the corridor houses the following features: washes, major drainage line (Heelbrandleegte River) and a small portion of quartz patches and outcrops.
- Heritage resources scattered throughout corridor.

The sensitive features identified in **Figure 10.2** specifically relate to ecological, avifauna habitats, and heritage resources. The following points provide a description of the features present within the development area:

- **Heritage**
  There is low heritage sensitivities scattered along the grid connection corridor, particularity in the south of the corridor. The heritage Impact assessment, there were no significant heritage resources identified within the grid connection corridor. Most of the heritage resources identified were Stone Age artefact scatters of varying significance. Numerous areas of low-density scatters of Middle and Later Stone Age lithics were also identified.

- **Avifauna**
  Almost the entire grid connection corridor falls within a medium avifauna sensitivity zone with just a portion south of the corridor located within a medium- high sensitivity area. An approximate total of 150 bird species are known to occur within the grid connection corridor and broader study area, of which 68 species were recorded on site during the two field surveys. Eight (8) of these species are listed as threatened, and another four (4) are considered Near-Threatened. Seven species are considered true near-endemics to South Africa, while twelve (12) are considered biome-restricted. The bird assemblage recorded within the grid connection corridor is fairly typical of the Kalahari bioregion, with elements of the Nama-Karoo.

- **Ecological**
  The section of the corridor where the Heelbrandleegte River crosses the corridor is considered as a very high or no-go ecological sensitivity. This section of the corridor is to be avoided during the construction of the power line and associated infrastructure. The southern section of the corridor illustrates some medium sensitivity fragments.

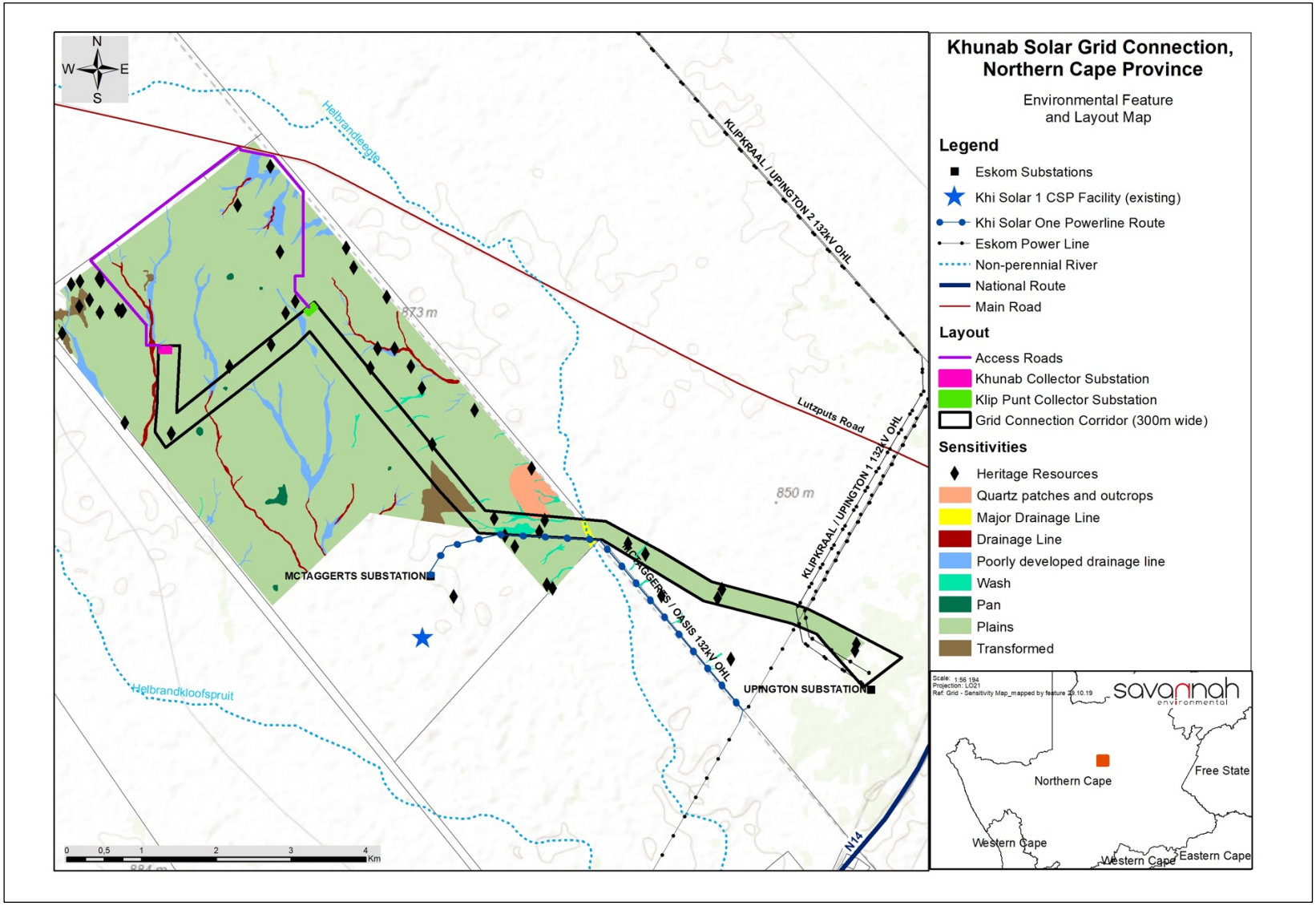

Figure 10.1: Environmental features identified within the Khunab Grid Connection Corridor

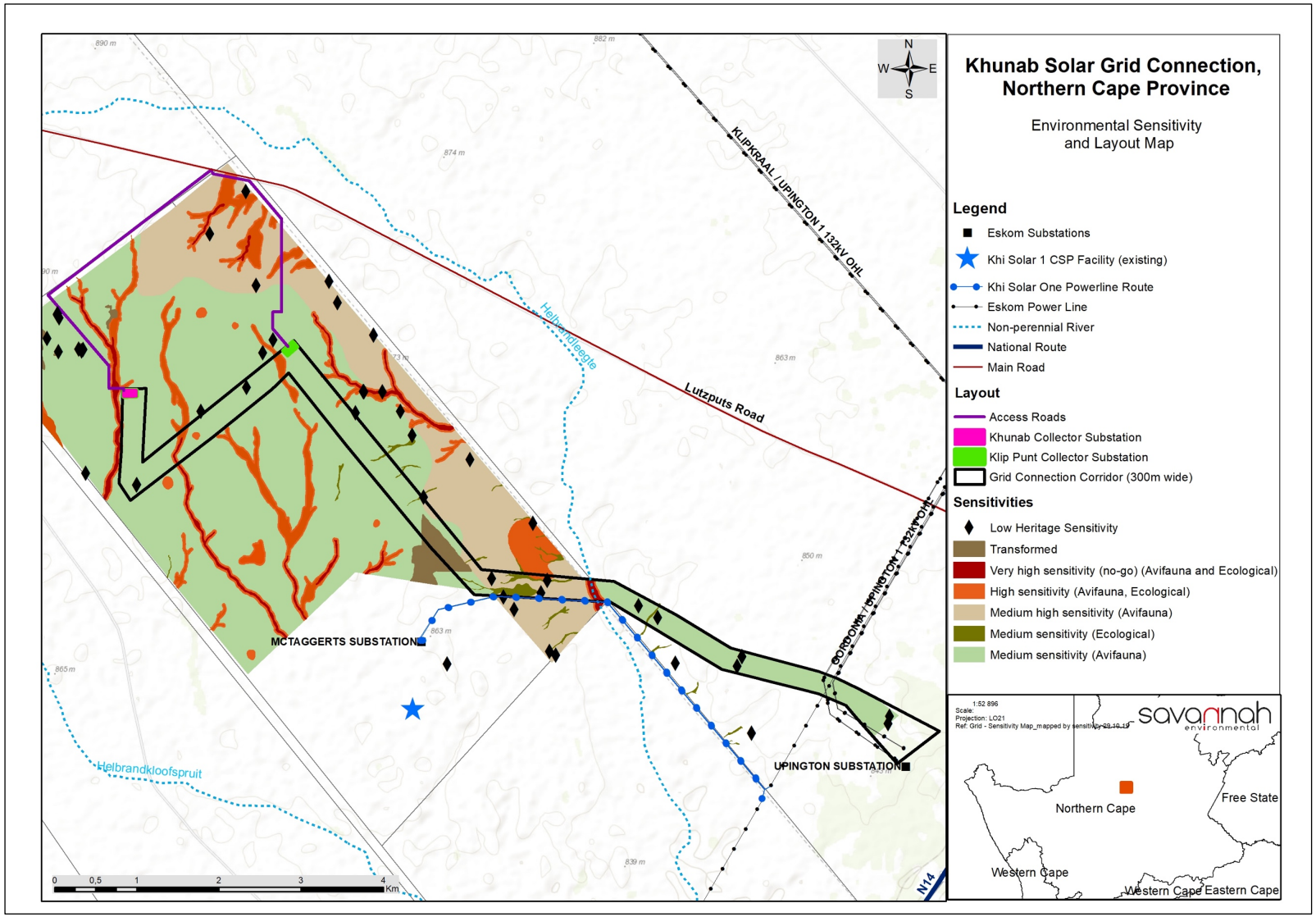

Figure 10.2: Environmental sensitivity map overlain with the assessed grid connection corridor within which the grid connection infrastructure for the Khunab Solar Grid Connection is proposed to be developed (**Appendix M**)

10.4. Environmental Costs of the grid connection infrastructure versus Benefits of the grid connection infrastructure

No fatal flaws have been identified to be associated with the proposed project. Environmental costs (including those to the natural, economic and social environment) can, however, be anticipated at a local and site-specific level, and are considered acceptable provided the mitigation measures as outlined in the BA Report and the EMPr are implemented and adhered to. These environmental costs could include:

- *A loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for grid connection infrastructure* - The cost of loss of biodiversity is considered to be limited due to the limited footprint of the development which will facilitate the placement of infrastructure within vegetation considered to be of a low sensitivity where possible.
- *Visual impacts associated with the grid connection solution* - The development of the grid connection infrastructure may have a visual impact within a 0.5km to 3km radius of the grid connection corridor, which will be of a low significance with the implementation of the recommended mitigation measures. As the development of the grid connection infrastructure will largely impact visually on an area where there currently is a low viewer incidence and low development density, changes to the landscape quality are unlikely to be problematic.
- *Change in land-use and loss of land available for agricultural activities within the development footprint* - The environmental cost is anticipated to be very limited due the fact that the grid connection corridor does not impact on any areas of high agricultural potential, and that grazing activities can continue undisturbed within the power line servitude during the operation phase of the grid connection infrastructure.

Benefits of the grid connection infrastructure include the following:

- The project will facilitate the connection of the four solar PV facilities (known as the Khunab Solar Development) to the national grid. South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. The Khunab Solar Development (four PV solar plants and associated grid connection solution) will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa. Without the grid connection infrastructure, this will not be possible.
- The project will result in important economic benefits at a local and national scale through an increase in production and GDP-R and employment. These will persist during the construction, operation and decommissioning phases of the project.
- The project indirectly contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.

The benefits of the grid connection infrastructure for the Khunab Solar Development are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of the grid connection corridor within areas considered to be acceptable for the development of the grid connection infrastructure, the benefits of the project are expected to outweigh the environmental costs of the grid connection infrastructure.

10.5. Overall Conclusion (Impact Statement)

The construction and operation of the grid connection solution for the Khunab Solar Development in the Northern Cape has been proposed by McTaggarts PV1 (Pty) Ltd. A technically viable grid connection corridor within which the infrastructure could be developed was proposed by the developer and assessed as part of the BA process. The assessment of the environmental suitability of the grid connection corridor for the development of the proposed grid connection infrastructure was undertaken by independent specialists and their findings have informed the results of this BA Report.

The specialist findings have indicated that there are no identified environmental fatal flaws or impacts of a high significance (following the implementation of mitigation) associated with the implementation of the grid connection infrastructure. The preferred grid connection option is therefore the technically preferred option, which is a direct connection of the two collector substations to the existing Upington MTS. All impacts associated with the project establishment within the grid connection corridor can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. The preferred layout map (including the details of the project) is included as **Figure 10.3.** The preferred layout overlain with the environmental sensitivities is included as **Figure 10.2**

Through the assessment of the development of the grid connection infrastructure within the grid connection corridor and the implementation of the preferred grid connection option it can be concluded that the proposed project is environmentally acceptable (subject to the implementation of the recommended mitigation measures) with no unacceptable impact significance of whole-scale change.

10.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the grid connection corridor proposed by the developer, the avoidance of sensitive environmental features within the grid connection corridor, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the development of the grid connection infrastructure for Khunab Solar Development (i.e. the Khunab Solar Grid Connection) is acceptable within the landscape and can reasonably be authorised to be developed within the assessed grid connection corridor (**Figure 10.3**).

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

- two (2) collector substations (known as the Khunab Collector Substation and Klip Punt Collector Substation), each including a switching station component;
- a single circuit 132kV overhead power line; and
- associated infrastructure such as access roads, feeder bays, a fibre and optical ground wire (OPGW) layout, insulation and assembly structure

The following key conditions would be required to be included within an authorisation issued for the grid connection infrastructure:

- The grid connection infrastructure for the Khunab Solar Grid Connection must be developed and optimised within the assessed grid connection corridor and must be placed within areas of low sensitivity and span features of high environmental sensitivity.
- All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D to J**, are to be implemented.
- The EMPr as contained within **Appendix K** of this BA Report should form part of the contract with the Contractors appointed to construct and maintain the grid connection infrastructure in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the infrastructure is considered key in achieving the appropriate environmental management standards as detailed for this project.
- Following the final design of the grid connection infrastructure, a final layout must be submitted to DEA for review and approval prior to commencing with construction.
- A pre-construction walk-through of the final power line alignment and the collector substation locations for species of conservation concern that would be affected and that can be translocated must be undertaken prior to the commencement of the construction phase.
- Before construction commences individuals of listed species within the development footprint that would be affected by the infrastructure and associated servitudes must be counted and marked and translocated, where deemed necessary, by the ecologist conducting the pre-construction walk-through survey. Permits from the relevant provincial authorities, i.e. the Northern Cape Department of Environment and Nature Conservation (DENC), must be obtained before the individuals are disturbed.
- A pre-construction walk-through of the power line route and collector substation locations to identify heritage sites that will be impacted by the grid connection infrastructure must be undertaken prior to the commencement of the construction phase.
- Monitoring of the 132kV power line must be undertaken as per the requirements included in the Avifauna Impact Assessment Report (**Appendix E**).
- The necessary water use license or general authorisation must be obtained from the Department of Water and Sanitation (DWS) for impacts to the Heelbrandleegte River prior to construction.
- A chance find procedure must be developed and implemented in the event that archaeological or palaeontological resources are found during the construction of the grid connection infrastructure. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately.
- All recommendations made by the DEA Directorate: Biodiversity for inclusion in the EA to be implemented.

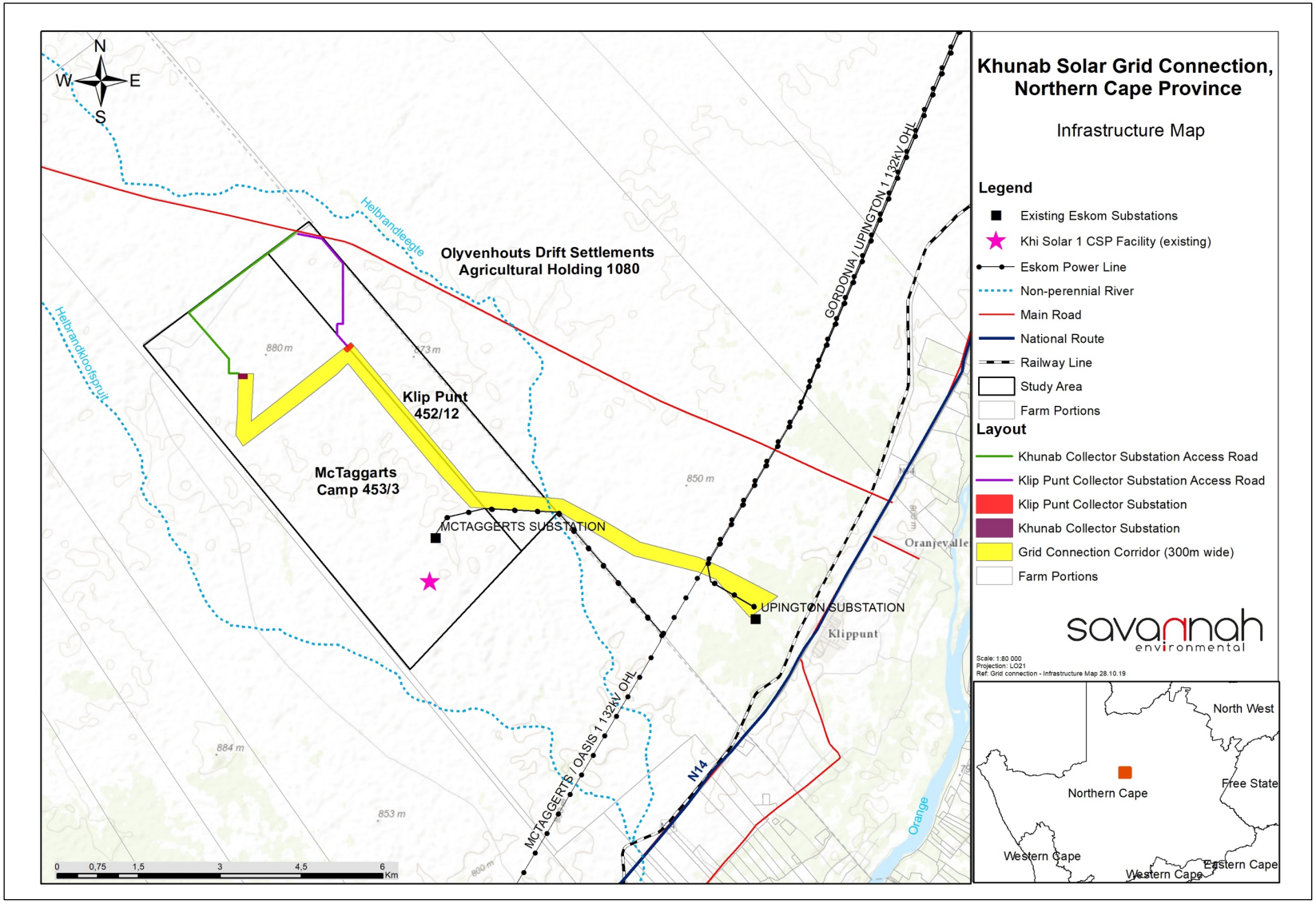

Figure 10.3: Preferred layout map for the grid connection infrastructure for the Khunab Solar Grid Connection, as was assessed as part of the BA process (A3 map included in **Appendix O**

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