KOTULO TSATSI ENERGY PV1, NORTHERN CAPE

Final Environmental Impact Assessment Report

April 2021

DEFF Reference No.: 14/12/16/3/3/2/2027

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PROJECT DETAILS

DEFF Reference No.	:	14/12/16/3/3/2/2027
Title	:	Environmental Impact Assessment Process: Environmental Impact Assessment Report for Kotulo Tsatsi Energy PV1, Northern Cape Province
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Applicant	:	Kotulo Tsatsi Energy (Pty) Ltd
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PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT

Kotulo Tsatsi Energy (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kotulo Tsatsi Energy PV1) located on a site located approximately 70km south-west of the town of Kenhardt and 60km north east of Brandvlei in the Northern Cape Province (refer to Figure 1.1). The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200MW. The facility will be located within the farm Portion 3 of Farm Styns Vley 280. The project site falls under the Hantam Local Municipality which is part of Namakwa District Municipality. The solar PV facility will be connected to the grid via a previously authorised grid connection solution , which consists of a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site. The site is accessible via an existing gravel farm road (known as Soafskolk Road) which provides access to the farm off of the R27 which is located east of the project site.

The PV facility is planned to be located adjacent to the authorised 100MW Kotulo Tsatsi PV2 facility, and within an area previously authorised for Concentrated Solar Power (CSP) project infrastructure. Site-specific studies and assessments have delineated areas of potential sensitivity within the identified project site.

The PV infrastructure assessed in this application is in response to the Applicant's need to change the authorised generation technology for the facility located on the farm Portion 3 of Farm Styns Vley 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the solar PV facility will be connected to the grid via a previously authorised grid connection solution , which consists of a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site.

In terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)), the proposed development of Kotulo Tsatsi Energy PV1 requires Environmental Authorisation (EA) from the National Department of Environment, Forestry and Fisheries (DEFF) subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA), as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326). The need for EA subject to the completion of a full S&EIA is triggered by the inclusion of, amongst others, Activity 1 of Listing Notice 2 (GNR 325)[1], namely:

"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more."

In terms of GNR 779 of 01 July 2016, the National DEFF has been determined as the Competent Authority (CA) 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 DEFF will be supported by the Northern Cape

[1] Refer to **Chapter 6** for a full list of applicable listed activities.

Department of Agriculture, Environmental Affairs, Rural Development and Land Reform as the commenting authority.

This EIA Report consists of eleven chapters, which include:

- **Chapter 1** provides background to the Kotulo Tsatsi Energy PV1 project and the environmental impact assessment.
- **Chapter 2** provides a project description of the Kotulo Tsatsi Energy PV1 project.
- **Chapter 3** describes identified project alternatives.
- **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa and specifically relating to the project.
- **Chapter 5** describes the need and desirability of Kotulo Tsatsi Energy PV1.
- **Chapter 6** outlines the approach to undertaking the Scoping/EIA process.
- **Chapter 7** describes the existing biophysical and social environment within and surrounding the study and development area.
- **Chapter 8** provides a description and assessment of the potential issues associated with the proposed solar PV facility and associated infrastructure.
- **Chapter 9** provides a description and assessment of the potential cumulative issues associated with the proposed solar PV facility and associated infrastructure.
- **Chapter 10** presents the conclusions and recommendations based on the findings of the EIA for the solar PV facility.
- **Chapter 11** provides references used to compile the EIA Report.

The EIA report was available for review from 12 March 2021 until 15 April 2021 at the following: https://savannahsa.com/public-documents/energy-generation/.

All comments submitted during the 30-day review period have been included, considered and addressed where relevant within this Final EIA Report (refer to Comments & Response Report in Appendix C8). This report is submitted for the consideration of the National Department of Forestry, Fisheries and the Environment (DFFE). Changes made in this EIA Report for final submission have been underlined for ease of reference.

EXECUTIVE SUMMARY

Kotulo Tsatsi Energy PV1 is located on a site located approximately 70km south-west of the town of Kenhardt and 60km north east of Brandvlei in the Northern Cape Province. The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200MW. The facility will be located within the farm Portion 3 of Farm Styns Vley 280. The project site falls under the Hantam Local Municipality which is part of Namakwa District Municipality. The site is accessible via an existing gravel farm road (known as Soafskolk Road) which provides access to the farm off of the R27 which is located east of the project site.

A development envelope of 847ha has been identified within the broader development area by the proponent for the development of Kotulo Tsatsi Energy PV1 and associated infrastructure, which has been fully considered within this EIA process and assessed in terms of its suitability from an environmental and social perspective within this EIA Report.

The development envelope is regarded as being of a sufficient extent to provide opportunity for the avoidance of major environmental sensitivities. Kotulo Tsatsi Energy PV1 will have a contracted capacity of up to 200MW and will include specific infrastructure, namely:

- Solar PV array footprint comprising of:
  - PV modules and mounting structures
  - Inverters and transformers
  - Integrated Energy Storage System (IESS)
  - Cabling between the project components
  - Internal access roads
- Access roads, internal distribution roads and fencing around the development footprint
- Admin block comprising of:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage
  - Assembly plant
  - Laydown areas

No environmental fatal flaws were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of features of high sensitivity within the project development envelope by the development footprint and the undertaking of monitoring, as specified by the specialists. Some mitigation measures have already been considered and implemented through the micro-siting of the solar PV facility development footprint, such as the avoidance of the drainage line located within the development area.

The potential environmental impacts associated with Kotulo Tsatsi Energy PV1 identified and assessed through the EIA process include:

- Impacts on ecology, flora and fauna.
- Impacts on freshwater resources.

- Impacts on avifauna.
- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area imposed by the components of the facility.
- Socio- economic impacts.

Impacts on Ecology (including flora and fauna)

The Terrestrial Ecology Assessment (Appendix D) undertaken determined that there are no impacts associated with the Kotulo Tsatsi Energy PV1 project that cannot be mitigated to an acceptable level and as such, the assessed layout was considered acceptable. The surrounding habitat is very homogenous therefore, the habitat loss resulting from the development would not result in significant local habitat loss for fauna or disrupt any broader scale movement corridors for fauna. Also, the site falls outside of any CBAs, ESAs and NC-PAES focus areas with the result that impacts on CBAs and the ability to meet future conservation targets would be minimal.

With the application of mitigation and avoidance measures, the impact of the Kotulo Tsatsi Energy PV1 on the local environment can be reduced to an acceptable magnitude. Overall, there are no specific long-term impacts likely to be associated with the development of the Kotulo Tsatsi Energy PV1 project that cannot be reduced to a low significance. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

Impacts on Freshwater Resources

The Freshwater Resources Assessment (Appendix F) concluded that there several watercourses consisting of depression wetlands, and minor and major streams located within the project area. The depression wetland and major ephemeral washes together with their associated 30m buffer areas are regarded as no-go areas for development of the Kotulo Tsatsi Energy PV1 facility and are required to be avoided. It was, therefore, recommended by the specialist that the PV infrastructure be located outside of this feature of a high sensitivity, and that the significance of the remaining impacts assessed for the aquatic systems after mitigation would be low. Road construction/upgrading and laying of cables may occur in major washes only where the use of existing access roads is not an option. The minor ephemeral washes and drainage lines are not regarded as no-go areas.

With recommendations and mitigation measures in place, impacts on the surface water resource integrity and functioning can be potentially reduced to a sufficiently low level. This would be best achieved by avoiding the high sensitivity features and buffer areas, incorporating the recommended management and mitigation measures into an Environmental Management Programme (EMPr) for the site, together with appropriate rehabilitation guidelines and ecological monitoring recommendations.

Based on the findings of the Freshwater Resources Impact Assessment there is no objection to the authorisation of the proposed activities.

Impacts on Avifauna

The Avifauna Assessment (Appendix E) determined that the Kotulo Tsatsi Energy PV1 site held very low species richness and abundance of priority collision-prone birds or Red Data species. The development area of Kotulo Tsatsi Energy PV 1 lies outside the 3km Martial Eagle nest site buffer. The impact assessment is based on the findings of four field surveys undertaken in 2016 and summer 2021. The avifauna impact

identified to be associated with the construction phase (including decommissioning) will be negative with a short-term duration and will have a magnitude ranging from moderate to low. For the operation phase, the impact will also be negative, with a long-term duration for the life of the facility and a magnitude of moderate to low.

During the construction phase (and decommissioning phase), direct avifauna impacts include habitat loss and disturbance related to vegetation clearance and the displacement of shy avifauna species as a result of noise and an increased human presence associated with construction-related activities. The significance of the construction phase impact will be low, with the implementation of mitigation measures.

Impacts on avifauna during the operation phase of Kotulo Tsatsi Energy PV1 include collisions with PV panels, and area avoidance. The significance of the impacts will be low, with the implementation of mitigation measures. No impacts of a high significance are expected to occur during the operation phase.

With the implementation of all project-specific recommendations and mitigation measures, there is no objection to the development of the Kotulo Tsatsi Energy PV1.

Impacts on Soil and Agricultural Potential
The determined land capabilities and climate capabilities of soils identified in the area, are associated with very restricted and very low land potential levels. No "High" land capability sensitivities were identified within the project area, including the development envelope. Considering the low sensitivity of the area to be affected by the project, the proposed activities will have an acceptable impact on agricultural productivity. It is therefore the specialist's opinion that the proposed activities may proceed as planned without the concern of loss of high sensitivity land capabilities or agricultural productivity (refer to Appendix G for a compliance statement).

Impacts on Heritage Resources (archaeological and paleontological)
No significant archaeological or other heritage resources of cultural significance located within the proposed Kotulo Tsatsi Energy PV1 development footprint (Appendix H). The impact rating was determined to be of low significance with mitigation, where required.

Construction-related activities are unlikely to have an impact on the fossil heritage if preserved within the development area, however, based on the experience of the specialist and the lack of any previously recorded fossils from the broader study area, it is unlikely that any fossil heritage will be preserved in the local lithology, and therefore the impact is considered to be of a low significance. As such, it is unlikely that the proposed development will negatively impact on significant palaeontological heritage on condition that the Chance Fossil Finds Procedure is implemented during excavation activities. The duration of the impact will be permanent should the impact occur and will have a low magnitude.

The specialist study recommended that the proposed Kotulo Tsatsi Energy PV1 facility should be authorised from an archaeological and paleontological perspective with the implementation of the recommended mitigation measures.

Visual Impacts
The Visual Impact Assessment (Appendix I) identified negative and neutral impacts on visual receptors during the construction and the operation phases. The impacts include a change in the character and sense of place of the landscape setting, a change in the character of the landscape as seen from the

secondary roads, a change in the landscape as seen from local homesteads, glare impacts which could affect road users, and visual impacts related to the operational, safety and security lighting of the solar PV facility on observers.

The duration of the impacts is expected to be long-term for majority of the visual impacts and with a magnitude ranging from low to small. The significance of the impacts will be low or medium (depending on the impact being considered) with the implementation of mitigation. No impacts of a high significance are expected to occur and it can be concluded that the development of Kotulo Tsatso Energy PV1 will be viewed in the context of the CSP facilities and the PV 2 project. The development of Kotulo Tsatso Energy PV1 is therefore considered to be acceptable from a visual perspective.

Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flaws for the proposed Kotulo Tsatsi Energy PV1 facility. It is therefore recommended, from a visual perspective that the development of the facility as proposed be supported, subject to the implementation of the recommended mitigation measures.

Social Impacts

The Social Impact Assessment (Appendix J) identified that most social impacts associated with the development of Kotulo Tsatsi Energy PV1 will have a short-term duration associated with the construction phase and long-term duration during the operation phase of the project. The magnitude of the impacts ranges from high to small (depending on the impact being considered) and the status thereof. Both positive and negative impacts have been identified for both the construction and operation phases of the development.

During the construction phase, negative impacts include, nuisance impacts (including noise and dust), an influx of construction workers and job seekers to the area and a change in population, safety and security impacts, impacts on daily living and movement patterns, visual and a sense of place impacts. The significance of the negative construction phase impacts will be low with the implementation of the recommended mitigation measures. The positive social impacts associated with the construction phase of Kotulo Tsatsi Energy PV1 include an economic multiplier effect; and direct and indirect employment and skills development opportunities. The significance of the positive impacts will be medium with the implementation of the recommended enhancement measures by the specialist.

Impacts associated with the operation of Kotulo Tsatsi Energy PV1 will be both positive and negative. The negative impacts are related to the change in the sense of place associated with the operation of the solar PV facility. The significance of the negative impacts will be low with the implementation of the recommended mitigation measures. The positive impacts associated with the operation of the facility relate to the development of non-polluting renewable energy infrastructure, a contribution to Local Economic Development (LED) and social upliftment, and the creation of employment and skill development opportunities for the local economy and the country. The significance of the positive impacts will be low and medium with the implementation of the recommended enhancement measures.

Kotulo Tsatsi Energy Pv1 is unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that Kotulo Tsatsi Energy PV1 can be authorised from a social perspective.

Assessment of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa and within the surrounding areas of the development area. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

Based on the specialist cumulative assessment and findings (Appendix D to Appendix J and Chapter 9 of the EIA), the development Kotulo Tsatsi PV1 and its contribution to the overall impact of all existing and proposed solar energy facilities within a 30km radius, it can be concluded that cumulative impacts will be of a low to high significance, with impacts of a high significance mainly relating to positive socio-economic impacts and to impacts on avifauna. It should however be noted that contribution of the Kotulo Tsatsi Energy PV1 to cumulative impacts to avifauna is low, and as a result the proposed development of the PV facility ought to be acceptable from an avifauna perspective.

Therefore, the development of Kotulo Tsatsi PV1 will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

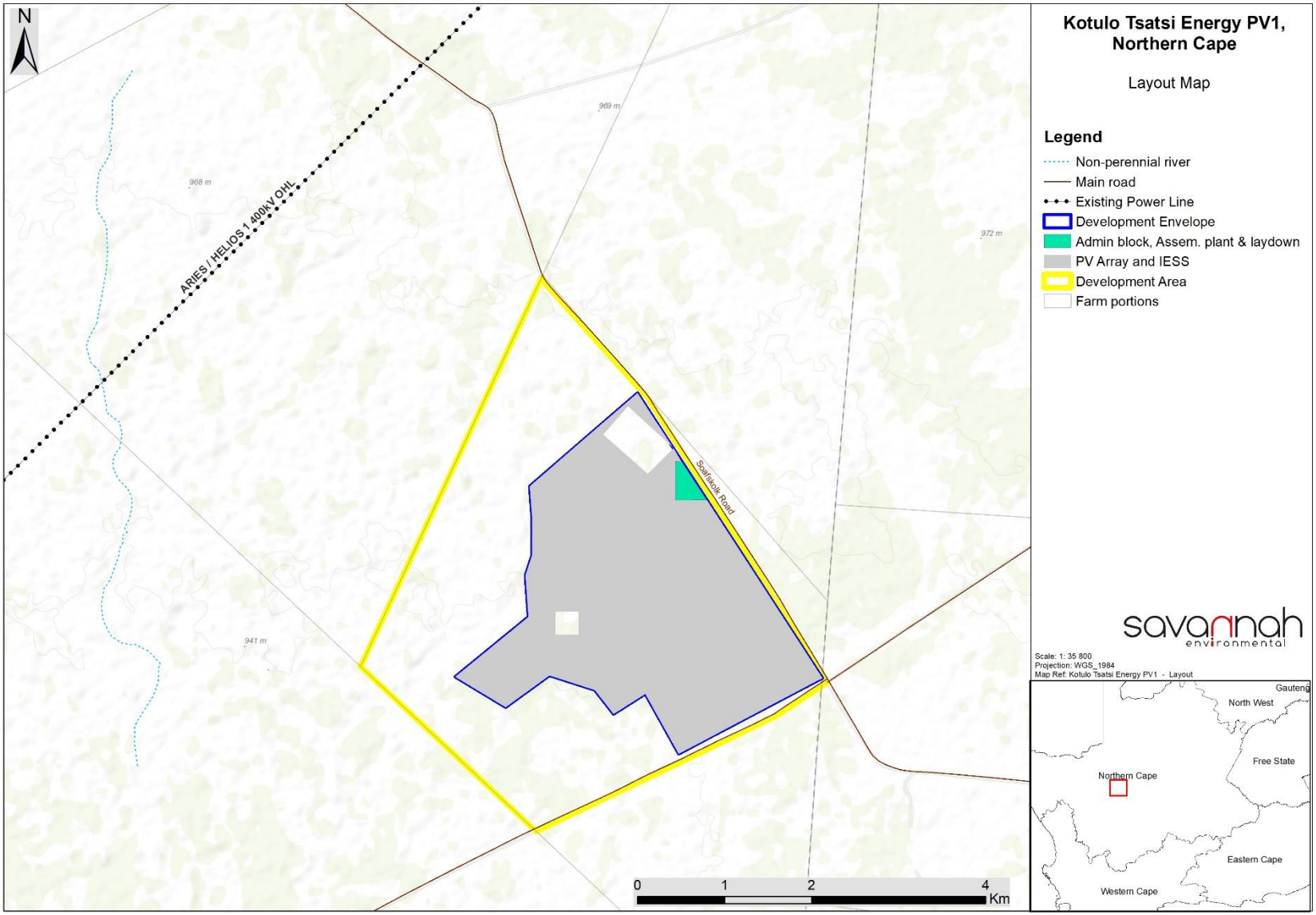

Figure 1: Layout Map of proposed Kotulo Tsatsi Energy PV1

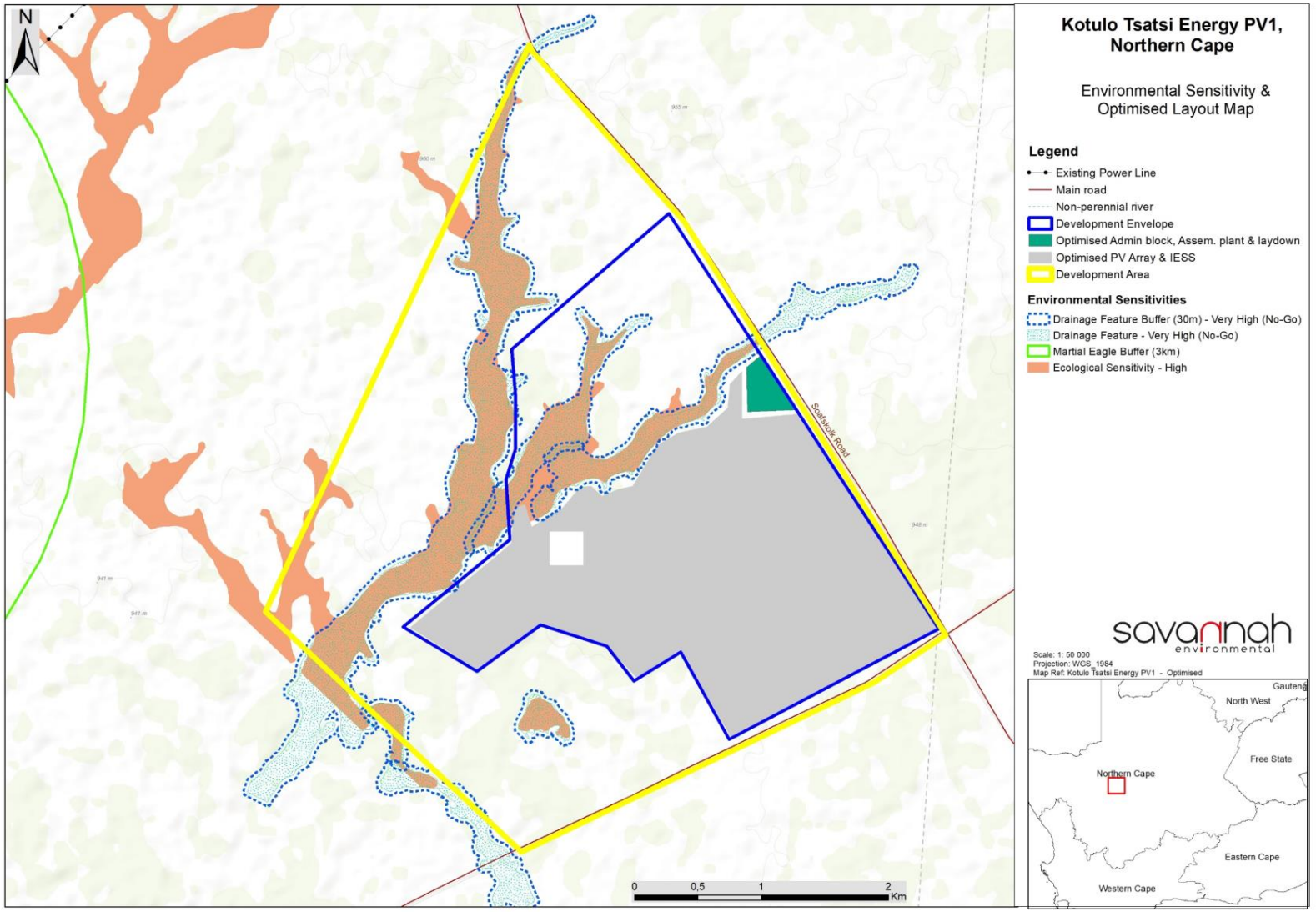

Figure 2: Final preferred (optimised) development footprint for Kotulo Tsatsi Energy PV1 facility overlain with high environmental sensitivities (A3 map included in Appendix O)

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

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

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

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

Waste: means—

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

Watercourse: as per the National Water Act means -
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

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

ACRONYMS

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

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

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APPENDICES LIST

CHAPTER 1 INTRODUCTION

The Applicant, Kotulo Tsatsi Energy (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kotulo Tsatsi Energy PV1) located on a site located approximately 70km south-west of the town of Kenhardt and 60km north east of Brandvlei in the Northern Cape Province (refer to **Figure 1.1**). The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200MW. The facility will be located within the farm Portion 3 of Farm Styns Vley 280. The project site[2] falls under the Hantam Local Municipality which is part of Namakwa District Municipality. The solar PV facility will be connected to the grid via a previously authorised grid connection solution[3], which consists of a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site. The site is accessible via an existing gravel farm road (known as Soafskolk Road) which provides access to the farm off of the R27 which is located east of the project site.

The PV facility is planned to be located adjacent to the authorised 100MW Kotulo Tsatsi PV2 facility, and within an area previously authorised for Concentrated Solar Power (CSP) project infrastructure. Site-specific studies and assessments have delineated areas of potential sensitivity within the identified project site.

The PV infrastructure assessed in this application is in response to the Applicant's need to change the authorised generation technology for the facility located on the farm Portion 3 of Farm Styns Vley 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the solar PV facility will be connected to the grid via a previously authorised grid connection solution[4], which consists of a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site.

From a regional perspective, the Kenhardt area is considered favourable for the development of a commercial solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the extent of the affected property, the availability of a direct grid connection (i.e. a point of connection to the national grid) and the availability of land on which the development can take place. Furthermore, other authorised solar facilities are located within the study area to the west of the development area.

Kotulo Tsatsi Energy PV1 is planned to be bid into the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply with Kotulo Tsatsi Energy PV1 set to inject up to 200MW_{AC} into the national grid.

[2] The project site is defined as Portion 3 of Farm Styns Vley 280, which has the extent of ~ 2560ha.

[3] A CSP facility plus associated infrastructure, including a complete grid connection to Aries Substation was previously authorised on the site. This PV facility replaces the CSP facility infrastructure, and will retain the authorised grid connection solution.

[4] A CSP facility plus associated infrastructure, including a complete grid connection to Aries Substation was previously authorised on the site. This PV facility infrastructure replaces the CSP facility infrastructure, and will retain the authorised grid connection solution (including all substations and power lines) and other associated infrastructure (including the man camp (including on-site accommodation), all water reservoirs and pipelines, the power block and thermal storage.

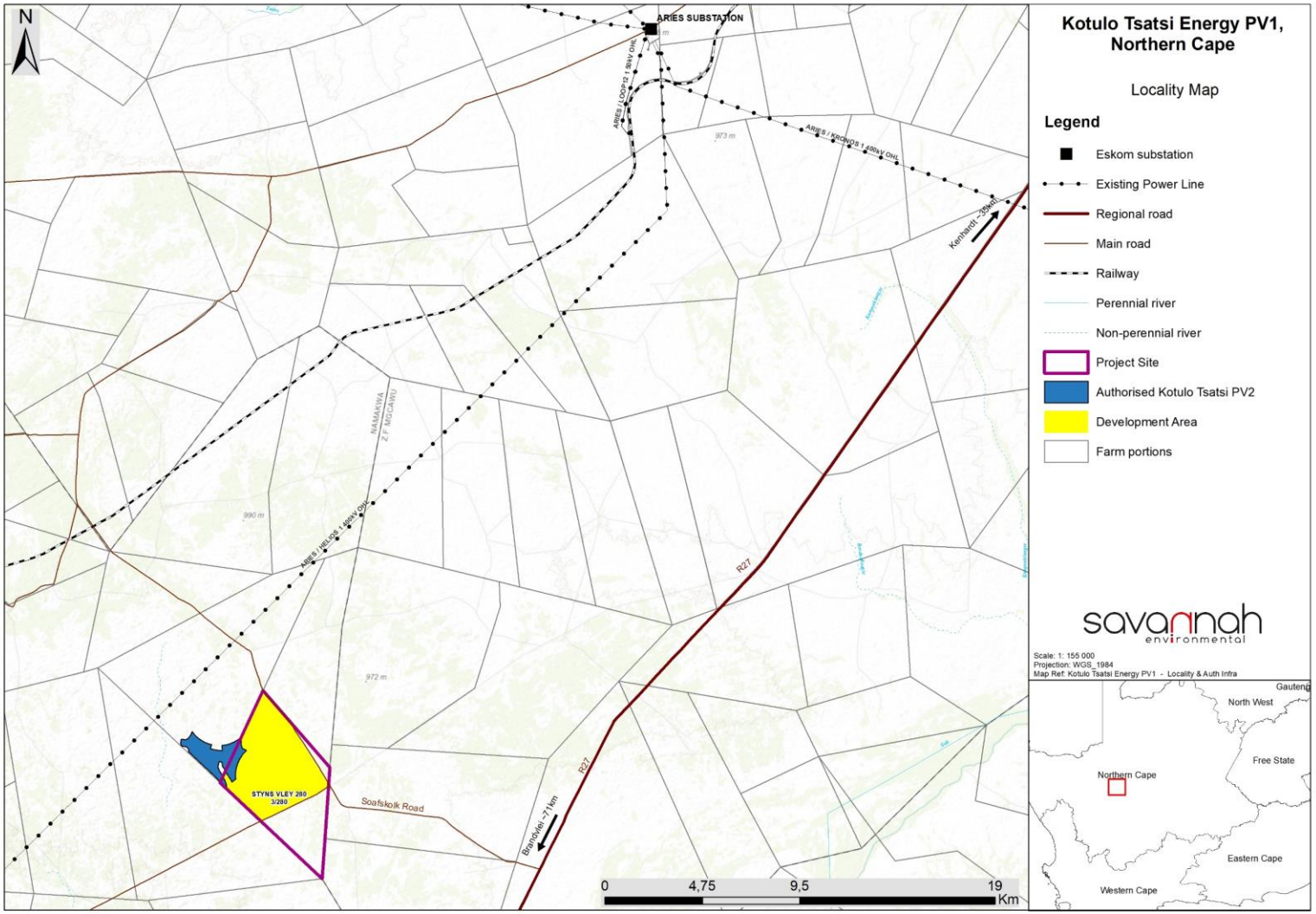

Figure 1.1: Locality map illustrating the location of the Kotulo Tsatsi Energy PV1 project site on Portion 3 of Farm Styns Vley 280 (refer to **Appendix D** for A3 map)

1.1 Project Overview

The project site has been identified by the applicant as a technically feasible site which has the potential for the development of a solar PV facility, including an Integrated Energy Storage System (IESS), and associated infrastructure. During the Scoping Phase, the full extent of the project site (i.e. approximately 2560ha) was considered, within which the development area for the project (approximately 1797ha) was appropriately located from a technical perspective. The purpose of assessing the full extent of the development area during the Scoping Phase was to determine the suitability from an environmental and social perspective, and identify areas that should be avoided in development planning. Based on the existing information, areas of environmental sensitivity were identified within the development area[5]. In order to avoid these areas of potential sensitivity identified during the Scoping Phase and to ensure that potential detrimental environmental impacts are minimised as far as possible, the developer identified a suitable development envelope (approximately 847ha in extent) within the larger development area, and planned the PV infrastructure for Kotulo Tsatsi Energy PV1 to be located within this area (that is the project development footprint, approximately 810ha in extent). Since the development area is larger than the area required for the development footprint, it provides the opportunity for the optimal placement of the infrastructure, ensuring avoidance of major identified environmental sensitives.

The Kotulo Tsatsi Energy PV1 facility will have a contracted capacity of up to 200MW. Infrastructure associated with the solar PV facility will include:

- Solar PV array footprint comprising of:
  - PV modules and mounting structures
  - Inverters and transformers
  - Integrated Energy Storage System (IESS)
  - Cabling between the project components
  - Internal access roads
- Access roads, internal distribution roads and fencing around the development footprint
- Admin block comprising of:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Assembly plant
  - Laydown areas

The key infrastructure components proposed as part of the Kotulo Tsatsi Energy PV1 facility are described in greater detail in Chapter 2 of this EIA Report.

The overarching objective for the Kotulo Tsatsi Energy PV1 facility is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and

5 The development area was previously authorised for the development of Concentrated Solar Power (CSP) technology (DEFF Ref.: 14/12/16/3/3/2/694/1), known as Kotulo Tsatsi Concentrated Solar Plant 1. However, this project is no longer being considered for the site as the development of CSP no longer forms part of the energy mix of the Country as indicated in the IRP.

maintenance costs, as well as potential social and environmental impacts. In order to meet these objectives, local level environmental planning issues have been assessed with the aid of site-specific specialist studies in order to delineate areas of sensitivity within the identified project site. These site-specific specialist studies have assisted in informing and optimising the design of the solar PV facility.

An overview of the project development site is provided in Table 1.1.

Table 1.1: Overview of the project site for the Kotulo Tsatsi Energy PV1 facility

Province	**Northern Cape Province**
District Municipality	Namakwa District Municipality
Local Municipality	Hantam Local Municipality
Ward Number (s)	Ward 3
Nearest town(s)	Kenhardt (~70km north-east) and Brandvlei (~60km south)
Farm name(s) and number(s) of properties affected by the Solar Facility	Farm Styns Vley 280
Portion number(s) of properties affected by the Solar Facility	Portion 3 of Farm Styns Vley 280
SG 21 Digit Code (s)	C03600000000002800003
Current zoning	Agricultural (grazing of cattle)
Site Coordinates (centre of affected property)	29°48'43.07"S ; 20°36'1.68"E

1.2 Requirement for an Environmental Impact Assessment Process

Section 24 of South Africa's National Environmental Management Act (No. 107 of 1998) (NEMA) pertains to Environmental Authorisations (EA), 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 (CA). The 2014 Environmental Impact Assessment (EIA) Regulations, as amended (GNR 326) published under NEMA prescribe the process to be followed when applying for Environmental Authorisation (EA), while the Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)) contain those activities which may not commence without EA from the CA.

In terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)), the proposed development of Kotulo Tsatsi Energy PV1 requires Environmental Authorisation (EA) from the National Department of Forestry, Fisheries, and the Environment (DFFE)[6] subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA), as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326). The need for EA subject to the completion of a full S&EIA is triggered by the inclusion of, amongst others, Activity 1 of Listing Notice 2 (GNR 325)[7], namely:

[6] Changed from Department of Environment, Forestry, and Fisheries (DEFF)

[7] Refer to **Chapter 6** for a full list of applicable listed activities.

"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more."

In terms of GNR 779 of 01 July 2016, the National DEFF has been determined as the Competent Authority (CA) 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 DEFF will be supported by the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform as the commenting authority.

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

This EIA 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 EIA Report includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Report:

Requirement	Relevant Section
(a)(i) the details of the EAP who prepared the report; and (ii) the expertise of the; including a curriculum vitae	The details of the EAP has been who prepared the report is included in **Section 1.5**. The Curriculum vitae of the Savannah Environmental team have been included as **Appendix A**.
(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 Kotulo Tsatsi Energy PV1 has been included under **Section 1.1** and within **Table 1.1**.
(c) a plan which locates the proposed activity or activities applied as well as the associated structures and infrastructure at an appropriate scale, or, if it is (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A locality map illustrating the location of the Kotulo Tsatsi Energy PV1 has been included as **Figure 1.1** in this chapter. A layout map is contained in **Appendix N**.

This EIA Report consists of eleven chapters, which include:

- **Chapter 1** provides background to the Kotulo Tsatsi Energy PV1 project and the environmental impact assessment.
- **Chapter 2** provides a project description of the Kotulo Tsatsi Energy PV1 project.
- **Chapter 3** describes identified project alternatives.
- **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa and specifically relating to the project.
- **Chapter 5** describes the need and desirability of Kotulo Tsatsi Energy PV1.
- **Chapter 6** outlines the approach to undertaking the Scoping/EIA process.

- **Chapter 7** describes the existing biophysical and social environment within and surrounding the study and development area.
- **Chapter 8** provides a description and assessment of the potential issues associated with the proposed solar PV facility and associated infrastructure.
- **Chapter 9** provides a description and assessment of the potential cumulative issues associated with the proposed solar PV facility and associated infrastructure.
- **Chapter 10** presents the conclusions and recommendations based on the findings of the EIA for the solar PV facility.
- **Chapter 11** provides references used to compile the EIA Report.

1.4 Overview of this Environmental Impact Assessment (EIA) Process

An EIA 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 the resolution of the issues reported on in the Scoping and EIA reports as well as dialogue with interested and affected parties (I&APs).

The EIA process comprises two (2) phases (i.e. Scoping and Impact Assessment) and involves the identification and assessment of potential environmental impacts through the undertaking of independent specialist studies, as well as public participation. The processes followed in these two phases is as follows:

- The **Scoping Phase** includes the identification of potential issues associated with the project through a desktop study (considering existing information) and consultation with affected parties and key stakeholders. This phase considered the broader project site in order to identify and delineate any environmental fatal flaws, 'no-go' and/or sensitive areas. Following a public review period of the Scoping report, this phase culminated in the submission of a final Scoping Report and Plan of Study for the EIA to the DEFF on 01 December 2020, and acceptance was received on 06 January 2021.
- The **EIA Phase** involves a detailed assessment of the potentially significant positive and negative impacts (direct, indirect, and cumulative) identified during the Scoping Phase. This phase considers a proposed development footprint within the project site and includes detailed specialist investigations as well as public consultation. Following a public review period of the EIA Report, this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the CA for final review and decision-making.

1.5 Appointment of an Independent Environmental Assessment Practitioner (EAP)

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), the applicant has appointed Savannah Environmental (Pty) Ltd as the independent environmental consultants responsible for managing the Application for EA and supporting Scoping and Environmental Impact Assessment (S&EIA) process; inclusive of comprehensive, independent specialist studies. The application for EA and S&EIA process is being managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), and all other relevant applicable legislation.

Neither Savannah Environmental nor any of its specialists are subsidiaries of, or are affiliated to the applicant. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed facility. A signed Environmental Assessment

Practitioner (EAP) declaration of interest confirming Savannah Environmental's independence is included in **Appendix A** of this EIA Report.

1.6 Details and Expertise of the Environmental Assessment Practitioner (EAP)

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) Contributor. Savannah Environmental's team have been actively involved in undertaking environmental studies since 2006, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development.

The Savannah Environmental team for this project includes:

» **Jana de Jager** is the principle author of this report. She holds a bachelor's degree in Environmental Science, an Honours degree in Geography and Environmental Science and is currently undertaking her M.S.c in Ecological Water Requirements. She has 3 years of experience in the environmental management field. Her key focus is on undertaking environmental impact assessments, GIS mapping, public participation, environmental management plans and programmes. She is registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP).

» **Lisa Opperman** holds a Bachelor degree with Honours in Environmental Management and has five years of experience in the environmental field. Her key focus is on EIAs, social impact assessments, public participation, environmental management plans and programmes, as well as mapping using ArcGIS. She has completed numerous EIA processes for renewable energy projects and associated grid connection infrastructure.

» **Karen Jodas** is a Director at Savannah Environmental (Pty) Ltd. Karen holds a Master of Science Degree from Rhodes University and is registered as a Professional Natural Scientist (400106/99) with the South African Council for Natural Scientific Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 20 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.

» **Nicolene Venter** – holds a Higher Secretarial Diploma and has over 20 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.

Curricula Vitae (CVs) detailing Savannah Environmental team's expertise and relevant experience are provided in **Appendix A** to this draft EIA Report. In order to adequately identify and assess potential impacts associated with the project, a number of independent specialist consultants have provided specialist input into the EIA process. The specialists have prepared assessment reports, which have informed and are appended to this draft EIA Report (refer to **Appendix A**).

CHAPTER 2 PROJECT DESCRIPTION

This Chapter provides a description of the proposed Kotulo Tsatsi Energy PV1 and associated infrastructure proposed for development. It must be noted that the project description as presented in this Chapter may be modified based on the outcomes and recommendations of detailed engineering and other technical studies, the findings and recommendations of this EIA and supporting specialist studies, and/or any licencing, permitting, and legislative requirements.

2.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Impact Assessment Report

This chapter of the EIA Report includes the following information required in terms of Appendix 3: Scope of Assessment and Content of the Environmental Impact Assessment Report:

Requirement	Relevant Section
(d) a description of the proposed activity, including (ii) a description of the associated structures and infrastructure related to the development	A description of the associated structures and infrastructure is included in **Section 2.5**. Activities to be undertaken during the various project development phases is included in **Section 2.6**.
(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of the development footprint alternatives considered;	A description of the selection of the proposed project site and development area is provided in **Section 2.3**.

2.2. Overview of Project Site

The project is to be developed on Portion 3 of the Farm Styns Vley 280, located approximately 70km south-west of the town of Kenhardt in the Northern Cape Province. The project site falls in Ward 3 of the Hantam Local Municipality and within the greater Namakwa District Municipality.

From a technical perspective, the Kenhardt area is considered favourable for the development of commercial solar energy facilities by virtue of the prevailing climatic conditions (primarily as the economic viability of a solar energy facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the extent of the project site and development area, the availability of a direct grid connection (i.e. point of connection to the national Eskom grid), and the availability of land on which development can take place.

The full extent of the project site (i.e. approximately 2560ha) was considered during the Scoping Phase of the EIA process, within which the development area[8] for the project (approximately 1797ha in extent) was appropriately located from a technical perspective.

A development envelope of ~847ha was defined through the Scoping evaluation of the site, and has now been assessed for the construction of the facility, which includes the PV and IESS infrastructure required to generate 200MW of electricity. The facility infrastructure would be developed within the development footprint and will have an extent of ~810ha. **Table 2.1** below provides an overview and description of the extents of the project site, development area, development envelop, and development footprint.

Table 2.2 provides information regarding the proposed project site identified for Kotulo Tsatsi Energy PV1.

Table 2.1: A description of footprints for the Kotulo Tsatsi Energy PV1

Footprint	Description and Extent
Project Site	Full extent of Portion 3 of the Farm Styns Vley 280. Approximately 2 560ha in extent
Development Area	A smaller focus area identified within the project site based on technical preferences and environmental constraints. Approximately 1797ha in extent
Development Envelope	An area identified considering and avoiding identified environmental constraints present within the development area Approximately 847ha in extent
Development Footprint	All development infrastructure associated with Kotulo Tsatsi Energy PV1 (some authorised infrastructure of the CSP facility, including substations and power block, is located within this area). Approximately 810ha in extent

Table 2.2: A description of the project site identified for Kotulo Tsatsi Energy PV1

Province	Northern Cape Province	
District Municipality	Namakwa District Municipality	
Local Municipality	Hantam Local Municipality	
Ward Number(s)	3	
Nearest Town(s)	Kenhardt (~70km north-east) and Brandvlei (~72km south)	
Farm Portion(s), Name(s) and Number(s) associated with the Facility	Portion 3 of Farm Styns Vley 280	
SG 21 Digit Code (s)	Portion 3 of Farm Styns Vley 280	C03600000000002800003
Current Zoning	Agriculture	
Current land use	Grazing (mainly livestock)	
Site Extent (project site)	~2560ha	

[8] The development area (~1797ha in extent) is a smaller focus area within the project site which has been selected as the best practicable option for the facility, considering the Soalskolk road, technical preferences and environmental constraints identified in the area. The development envelope has been identified within the development area, which is the area assessed during the EIA Phase for the placement of the facility layout.

		Latitude:	Longitude:
Site Co-ordinates (project site)	Northern point	29°46'50.19"S	20°35'48.19"E
	Eastern point	29°49'21.61"S	20°37'49.70"E
	Southern point	29°50'16.81"S	20°35'44.97"E
	Western point	29°49'15.08"S	20°34'30.03"E
	Centre point	29°48'43.07"S	20°36'1.68"E

2.2. Summary of Site Selection Process and Pre-Feasibility Analysis

The broader study area (i.e. the greater Kenhardt area) was identified by the applicant as having the potential for the installation of PV panels on the basis of key technical criteria being met, including the solar resource, accessibility of the site, accessibility to the Eskom grid, and local site topography. The development area was also previously authorised for the development of Concentrated Solar Power (CSP) technology (Kotulo Tsatsi Concentrated Solar Plant 1, DEFF Ref.: 14/12/16/3/3/2/694/1) which contributes to the selection of the development area for the development of a solar PV energy facility. The development of Kotulo Tsatsi Concentrated Solar Plant 1 is no longer being considered for the site as the development of CSP no longer forms part of the energy mix of the country, as indicated in the IRP.

Considering the fact that the development area was previously authorised for the development of CSP technology, the selection of the site for development of a PV facility is linked to the previous process. The 'funnel down' approach was followed during site selection and the impact assessment process in order to allow the environmental sensitivity investigation to inform the siting and preliminary layout design. The EIA Report for the Kotulo Tsatsi Concentrated Solar Plant 1 considered alternative sites within a larger 55 000ha area following a reasonable methodology, and due consideration of the sensitivity of the site. Ultimately, the site selection was based on the application of the mitigation hierarchy, which considered:

1. First, avoidance of adverse impacts as far as possible by use of preventative measures (in this instance a sensitivity analysis assisted in the identification of a project site and the avoidance of identified ecologically sensitive areas).
2. Second, minimisation or reduction of adverse impacts to 'as low as practicable' (in this instance minimisation of impact on identified ecologically sensitive areas through facility micro-siting and implementing mitigation)
3. Third, remedy or compensation for adverse residual impacts, which are unavoidable and cannot be reduced further (in this instance, the implementation of mitigation, or consideration of acceptable loss).

The project site was identified and considered acceptable through preceding investigations. The development area has been identified by the developer as a suitable area within which the solar PV facility can be positioned from a technical perspective, also taking advantage of the associated infrastructure which was previously authorised.

A development envelope has been sited within the development area through consideration and avoidance of the environmental sensitivities identified in the Scoping phase, during the EIA process of the Kotulo Tsatsi Concentrated Solar Plant 1, as well as the most recent Northern Cape Provincial conservation data (including conservation targets), such as Critical Biodiversity Areas and Wetlands.

The detail regarding site-specific characteristics, and how these provide further motivation for the selection of the specific site for this project is provided below:

Project site extent, conditions and land availability: Availability of relatively level land of sufficient extent can be a restraining factor to PV development, as a 200 MW solar PV development and associated infrastructure requires sufficient land space. The development envelope, within which the project development footprint will be located, is ~847ha. This area is considered to be sufficient for the planned 200MW PV facility, and provides an opportunity for the avoidance of sensitive environmental features and areas.

The following are key considerations in this regard:

- The project site and development area conditions are optimal for a development of this nature, with the site being of a suitable gradient for the development of a PV facility.
- The region within which the project site is located can be described flat and homogenous. Elevation across the area ranges from 940m above sea level in the west to 950m above sea level in the east. There are no prominent hills within the project site with the highest areas of elevation situated to the north east of the project site.
- The property is considerably larger than the area planned for the PV facility. The development area is approximately 1797ha (~70% of the total extent of the farm portion). The development envelope, which considers and avoids environmental sensitivities, is approximately 47% of the development area.

Site access: The site can be readily accessed via an existing gravel access road (known as the Soafskolk Road) branching off of the R27 between Kenhardt and Brandvlei, with only minor improvements to the turnoff onto the access road from the R27 considered appropriate to improve road safety.

Land use considerations: There is no cultivated agricultural land in the project site or directly adjacent to it, which could be impacted upon by the proposed development. The farm portion is not optimal for agricultural land use activities owing to restrictions by the arid climate and shallow soils, limiting the overall agricultural potential of the site to very low and rendering a low carrying capacity for livestock. Considering the limitations of the area from an agricultural perspective, the development of Kotulo Tsatsi Energy PV1 provides opportunity for an alternative land use which will not be in conflict with the existing land use, and which will provide a productive and economically viable solution. The development of Kotulo Tsatsi Energy PV1 will therefore not result in a reduction of the sustainability of the current land use and is considered to be appropriate.

Grid connection considerations: Ease of access into the Eskom national electricity grid is vital to the viability of a solar energy facility, and addresses Eskom's concerns for lower cost connection alternatives given current funding constraints. The project site is situated within the Central Corridor of the Strategic Transmission Corridors (GNR 113) and south of the existing Aries-Helios 400kV power line and approximately 50km south-west from the Eskom Aries Substation. In addition to the existing grid connection infrastructure available in the area, grid infrastructure components were also authorised as part of the Kotulo Tsatsi Concentrated Solar Plant 1 which includes an Eskom collector substation, switching station, and grid connection power line to the Aries Substation. These authorised components will also be used by Kotulo Tsatsi Energy PV1 to connect the project to the national grid.

A map illustrating the location of the project site, and development area is provided in **Figure 2.1**.

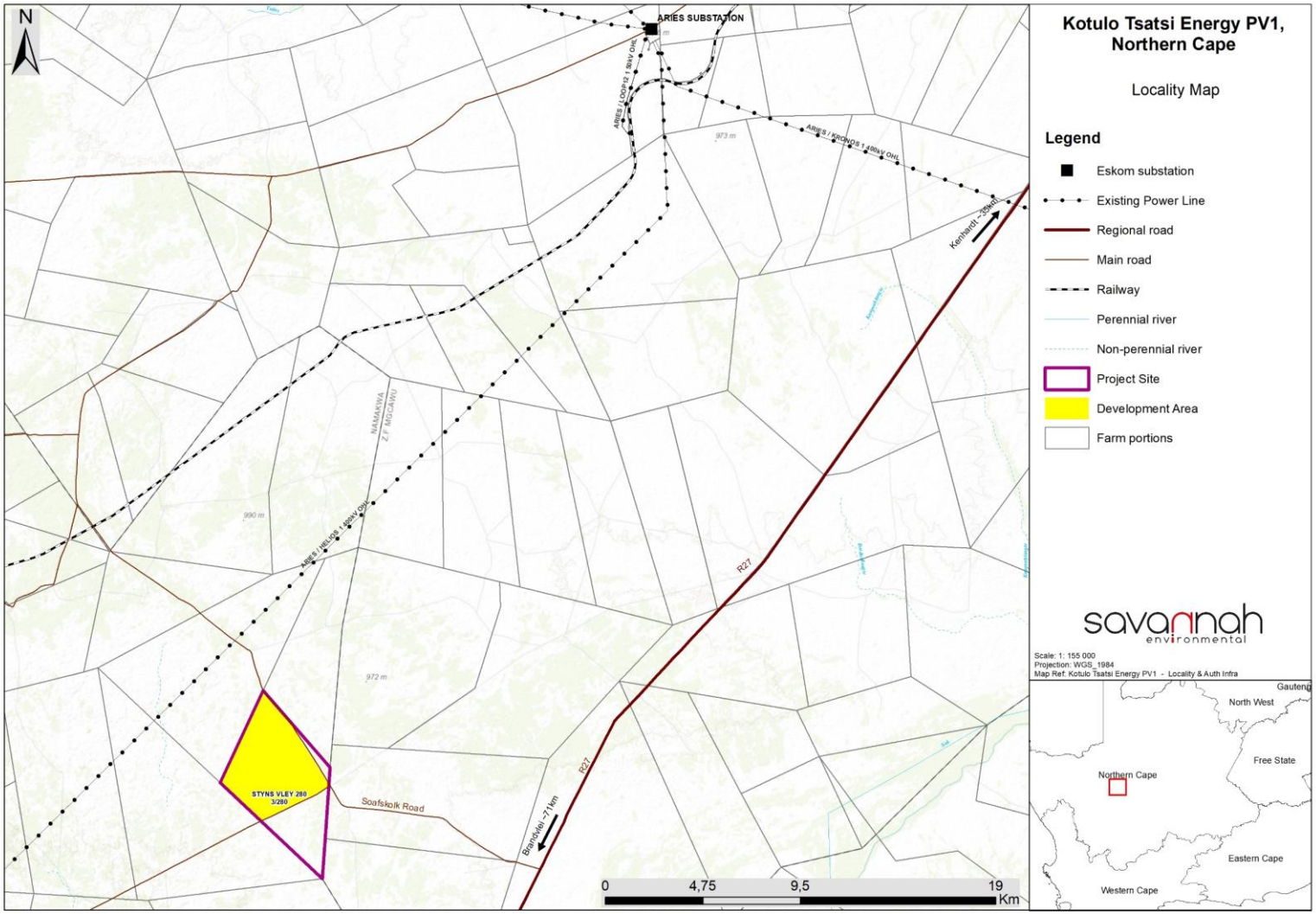

Figure 2.1: Map illustrating the Kotulo Tsatsi Energy PV1 development area within the project site

2.3 Technology considered for the Solar Energy Facility and the Generation of Electricity

Kotulo Tsatsi Energy PV1 will have a contract capacity of 200MW and will make use of PV technology. Solar energy facilities, which utilise PV technology, use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity (refer to **Figure 2.2**).

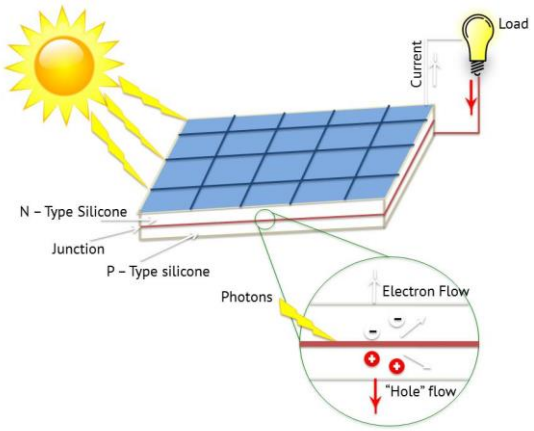

Figure 2.2: Diagram illustrating the Photovoltaic Effect (Source: Centre for Sustainable Energy)

The Photovoltaic Effect is achieved through the use of the following components:

Photovoltaic Cells

A PV cell is made of silicone that acts as a semi-conductor used to produce the Photovoltaic Effect. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV panel (refer to **Figure 2.3**). Each PV cell is positively charged on one side and negatively charged on the opposite side, with electrical conductors attached to either side to form a circuit. This circuit captures the released electrons in the form of an electric current (i.e. Direct Current (DC[9])).

[9] DC (direct current) is the unidirectional flow or movement of electric charge carriers (which are usually electrons). The intensity of the current can vary with time, but the general direction of movement stays the same at all times. As an adjective, the term DC is used in reference to voltage whose polarity never reverses. In a DC circuit, electrons emerge from the negative, or minus, pole and move towards the positive, or plus, pole. Nevertheless, physicists define DC as traveling from plus to minus. (sourced from https://whatis.techtarget.com/definition/DC-direct-current).

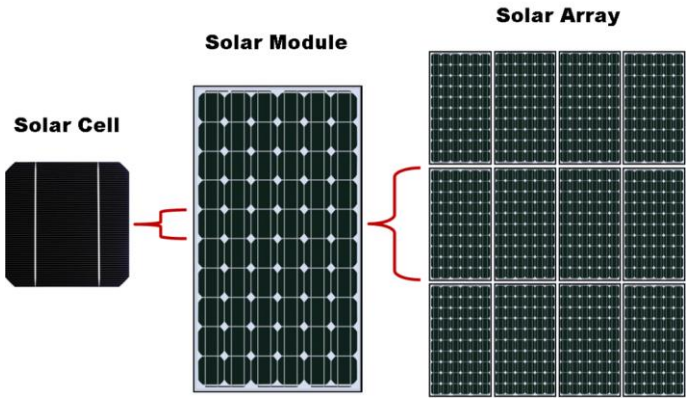

Figure 2.3: Overview of a PV cell, module and array / panel (Source: pveducation.com)

Support Structures

PV panels will be fixed to a support structure. PV panels can either utilise fixed/static support structures, or single or double axis tracking support structures (refer to **Figure 2.4**). PV panels which utilise fixed/static support structures are set at an angle (fixed-tilt PV system) so as to optimise the amount of solar irradiation. With fixed/static support structures the angle of the PV panel is dependent on the latitude of the proposed development and may be adjusted to optimise for summer and winter solar radiation characteristics. PV panels which utilise tracking support structures track the movement of the sun throughout the day so as to receive the maximum amount of solar irradiation.

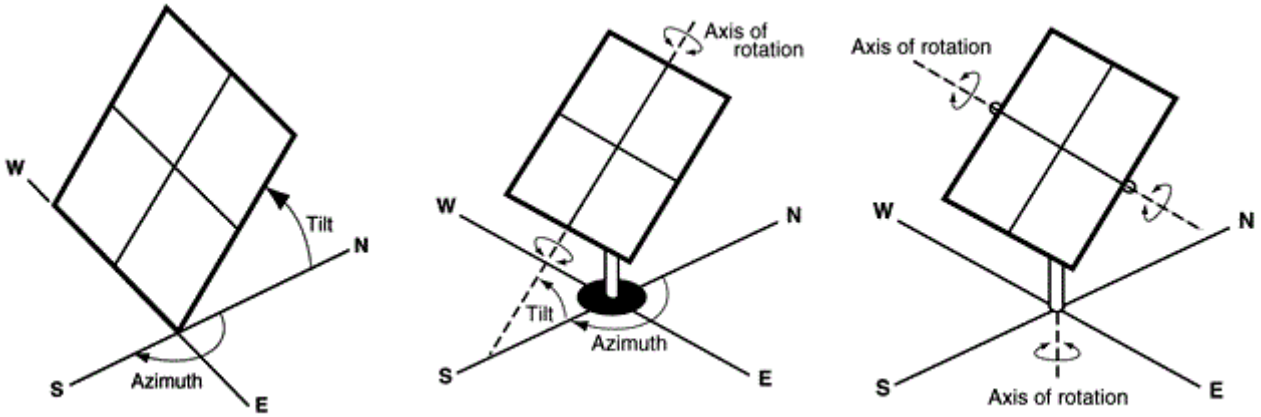

Figure 2.4: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

PV panels are designed to operate continuously for more than 25 years, mostly unattended and with low maintenance.

2.4 Description of the Facility and Associated Infrastructure

The infrastructure associated with this PV development includes:

- Solar PV array footprint comprising of:
  - PV modules and mounting structures

- Inverters and transformers
- Integrated Energy Storage System (IESS)
- Cabling between the project components
- Internal access roads

» Access roads, internal distribution roads and fencing around the development footprint
» Admin block comprising of:
- Site offices and maintenance buildings, including workshop areas for maintenance and storage
- Assembly plant
- Laydown areas

The assessment of the PV facility on the site is to support the technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the following previously authorised infrastructure, and the associated footprint areas, as part of the Kotulo Tsatsi CSP 1project[10] will be retained for use for the planned PV facility and have not been reassessed in this EIA:

» Complete grid connection to Aries Substation:
- Grid connection via a previously authorised grid connection solution, which consists of internal grid reticulation, a collector substation, switching substation and a power line to the Eskom Aries Substation located north-east of the project site.

» Other associated infrastructure:
- facility man camp (including on-site accommodation),
- all water reservoirs and pipelines,
- power block and thermal storage solution.

A summary of the planned infrastructure proposed as part of Kotulo Tsatsi Energy PV1 is provided in **Table 2.3** and described in more detail under the sub-headings below. A summary of authorised infrastructure is provided is **Table 2.4**.

Table 2.3: Planned infrastructure proposed as part of Kotulo Tsatsi Energy PV1

Infrastructure	Dimensions/ Details
Solar Facility	» 200MW photovoltaic (PV) technology utilising solar panels.
Supporting Infrastructure	» Integrated energy storage system (IESS). » Maintenance building. » Office building. » Batching plant. » Laydown area. » Perimeter fencing. » Internal access roads.
Access road	» The construction of a new access road off of the Soafskolk Road, which traverses the northern boundary of the development area.

[10] DEFF Ref: 14/12/16/3/3/2/694/1

Services required	» Refuse material disposal - all generated refuse material will be collected by a private contractor and will be disposed of at a licensed waste disposal site off site. This service will be arranged with the municipality when required. » Sanitation – due to the location of the site it is proposed that the project will construct and utilise its own sanitation services as Municipal services do not service the project site. All sewage/effluent water will be managed utilising temporary portable chemical toilets and portable modular sewage treatment facilities (package plants). These facilities will be maintained and serviced regularly by an appropriate waste contractor. » Water supply – due to the location of the site it is proposed that the project will utilise and develop its own water provision services based on the fact that these services do not reach the project site. Accordingly, construction water may need to be sourced from municipal supply (by water tankers); » Electricity supply – approximately 15MW of power may be required during the construction phase. It is proposed that this power be sourced from the existing power lines and/or diesel generators. The necessary applications for the connection to the grid will be submitted to Eskom for approval. » The man camp will require the necessary services such as potable water, electricity and a package plant for waste.

Table 2.4 Authorised infrastructure of Kotulo Tsatsi CSP 1 proposed for use as part of Kotulo Tsatsi Energy PV1

Infrastructure	Dimensions/ Details
Authorised infrastructure	» Auxiliary facilities » On-site IPP/Project Substation and Eskom Substation » Grid connection infrastructure up to 400kV between the IPP/Project Substation and the Eskom Substation infrastructure to Aries MTS » Access roads (roads up to 8m wide) » Water supply pipeline within existing road reserves (up to 95km in length) » Water storage reservoir and tanks (20 000m^3 and 5 000m^3) » Water treatment facilities » Plant assembly area » Workshop and office buildings » Man Camp » Molten salt circuits – includes the thermal storage tanks for storing low and high temperature liquid salt, a central solar-thermal tower receiver, pipeline and molten salt to steam heat exchangers » Power block – consists of the steam turbine and generator, as well as the air-cooled condenser and associated feedwater system

2.4.1 Project Development Footprint/Facility Layout

The development footprint for the Kotulo Tsatsi Energy PV1 assessed within the EIA is ~810ha in extent. The facility layout design includes (refer to **Figure 2.5**):

» PV modules and mounting structures
» Inverters and transformers
» Integrated Energy Storage System (IESS)
» Cabling between the project components
» Internal access roads

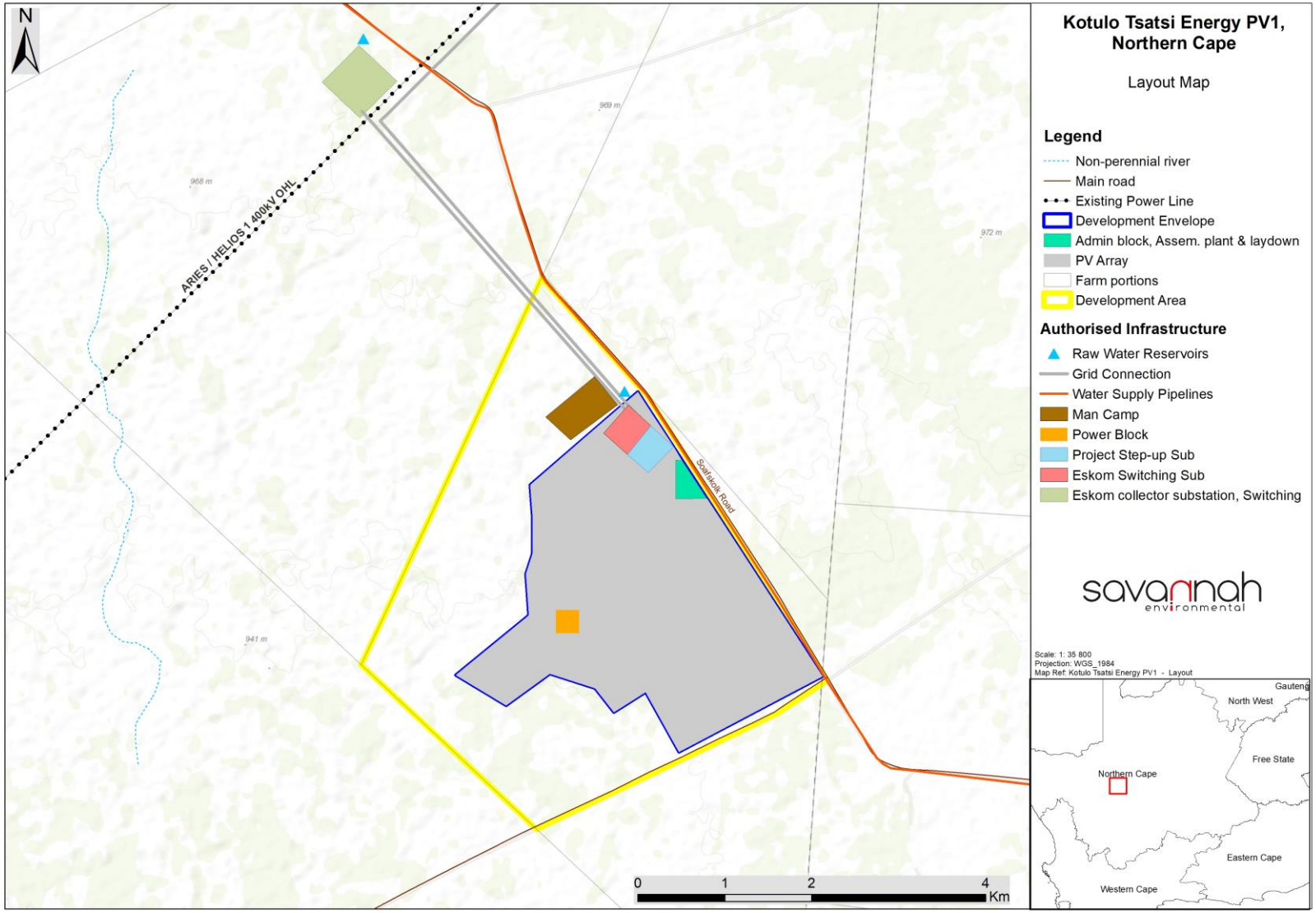

Figure 2.5: Layout of Kotulo Tsatsi Energy PV1 development including authorised infrastructure.

The type of technology selected for implementation, outcomes of the EIA process, and the completion of additional technical studies (e.g. geotechnical and other surveys) to be conducted as part of the detailed design phase will ultimately influence the final project layout and development footprint. The extent of the project site under investigation allows for layout design and site-specific alternatives to be identified considering the environmental sensitivities present. The final facility design is required to be approved by the DEFF prior to any construction activities commencing on-site. Should any substantive changes or deviations from the original scope or layout of the project reflected in the EIA process occur, DEFF would need to be notified thereof, and where applicable additional approval may need to be obtained.

2.4.2 Details of the proposed project infrastructure

Kotulo Tsatsi Energy PV1 is designed to have a contracted capacity of up to 200MW. The project will make use of fixed-tilt, single-axis tracking, and/or double-axis tracking PV technology. The use of monofacial or bifacial panels are both considered. PV technology forms part of the energy mix as indicated in the latest IRP for South Africa.

The project will comprise solar panels which, once installed, will stand less than 5m above ground level. The solar panels will include centralised inverter stations, or string inverters mounted above ground. The Integrated Energy System (IESS) for the project will consist of a decentralised battery energy system which will form part of the PV array and distributed throughout the array. The capacity of the IESS will be up to 800MWh for storage of up to 4 hours.

The proposed access road off the Soafskolk Road, which traverses the northern boundary of the development area, will have a width of up to 8m. Internal access roads will have width of up to 6m.

2.4.3 Energy Storage

The general purpose and utilisation of the Integrated Energy Storage System (IESS) will be to save and store excess electrical output from the facility as it is generated, allowing for a timed release to the national grid when the capacity is required. The IESS will, therefore, provide flexibility in the efficient operation of the electricity grid through decoupling of the energy supply and demand and will allow for longer generating periods of the solar PV facility. Furthermore, the development of the IESS for the project is of importance as the system will ensure that electricity is fed into the national grid when required and excess amounts stored. This will allow for extended hours (up to 4 hours) of generation from the 200MW solar energy facility. The IESS will be contained within insulated containers integrated and distributed throughout the PV array and will connect to the on-site facility substation via underground cabling which will follow the internal access roads of the facility. **Figure 2.6** provides a general illustration of an IESS.

Figure 2.6: Example of battery storage units integrated as part of PV array (Source: nexttracker.com)

2.4.4 Water Supply

Kotulo Tsatsi Energy PV1 will utilise water during both the construction and operation phases of development. Water is required during construction for dust suppression, and potable water will be required on site for the construction crew. During operation, water is required to clean the PV panels, for human consumption, and for use in the auxiliary buildings (i.e. for use in the office building, and ablutions,). Approximately 10 000m³ of water per year may be required over a 12 to 18-month period during construction, and approximately 50 000m³ of water per year may be required per year over the 25-year operational lifespan of the project.

Due to the location of the site, the project may develop its own water provision services as local reticulation services do not reach the project site. Water required for the construction phase may need to be sourced from the Kenhardt municipal supply and brought to the site via water tankers. An agreement from the local municipality for Bulk Water Supply Services to the proposed Kotulo Tsatsi Energy PV1 Project is included in Appendix Q.

2.4.5 Panel Cleaning

It is anticipated that the PV panels will be washed twice a year during operation. Only clean water (i.e. with no cleaning products), or non-hazardous biodegradable cleaning products will be utilised for the washing of panels. Wastewater generated by washing panels will either be collected and recycled for future use, or alternatively, in the event that an environmentally friendly non-hazardous biodegradable cleaning product is utilised, wastewater can be allowed to run-off under the panels.

2.4.6 Effluent and Wastewater

During construction, chemical toilets will be used. These will be serviced regularly and effluent will be disposed of at a registered wastewater treatment works. Any other effluent discharge during construction will be collected in sealed containers/tanks and collected by a registered service provider (i.e. the local municipality/contractor) to be disposed of at an approved facility off-site.

Due to the location of the site, it is proposed that the project will construct and utilise its own sanitation services as Municipal services do not service the project site. All sewage/effluent water will be managed utilising temporary portable chemical toilets and portable modular sewage treatment facilities (package plants). These facilities will be maintained and serviced regularly by an appropriate waste contractor.

2.4.7 Waste

Solid waste generated during construction will mainly be in the form of construction material, excavated substrate and domestic solid waste. Waste will be disposed of in either waste skips and/or scavenger proof recycling bins (where possible) and temporarily placed in a central location for removal by an appropriate contractor. Where possible, waste will be recycled. Non-recyclable solid construction waste will be temporarily held in skips or other appropriate waste containers to be disposed of at an appropriately licensed landfill site. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility.

During construction, use of the following hazardous substances are anticipated: paint, grease, petrol / diesel for trucks, cranes, bulldozers etc. Limited amounts of transformer oils and chemicals. Dangerous goods required to be stored during construction (e.g. limited quantities of fuel, oil, lubricants etc.) will be stored in compliance with relevant legislation (i.e. stored on covered and bunded areas / bin, and disposed of at a registered hazardous waste site). Hazardous waste will be appropriately stored and disposed of.

2.5 Activities during the Project Development Stages

A series of activities are proposed as part of the design, pre-construction, construction, operation, and decommissioning phases associated with the development of Kotulo Tsatsi Energy PV1. These are discussed in more detail under the respective sub-headings below.

2.5.1 Design and Pre-Construction Phase

Planning: Several post-authorisation factors are expected to influence the final design of the solar energy facility and could result in small-scale modifications of the PV array and/or associated infrastructure. An objective of the Engineering, Procurement and Construction (EPC) Contractor, who will be responsible for the overall construction of the project, will be to comply with the approved facility design as far as possible. It should be understood however, that the construction process is dynamic and that unforeseen changes to the project specifications may take place. This EIA Report therefore describes the project in terms of the best available knowledge at the time. Should there be any substantive changes or deviations from the original facility layout of the project, the DEFF will be notified and where relevant, the final facility design approved by the DEFF.

Conduct Surveys: Prior to initiating construction, a number of surveys will be required including, but not limited to, confirmation of the micro-siting footprint (i.e. the precise location of the PV panels, on-site facility substation and the associated infrastructure) and a geotechnical survey. Geotechnical surveys acquire information regarding the physical characteristics of soil and rocks underlying a proposed project site and inform the design of earthworks and foundations for structures.

2.5.2 Construction Phase

The construction phase will take approximately 12 to 18 months to complete, and will entail a series of activities including:

Procurement and employment

At the peak of construction, the project is likely to create a maximum of 500 employment opportunities. These employment opportunities will be temporary and will last for a period of approximately 12 to 18 months (i.e. the length of construction). Employment opportunities generated during the construction phase will include low skilled, semi-skilled, and skilled opportunities. Solar PV projects make use of high levels of unskilled and semi-skilled labour so there will be good opportunity to use local labour, where available. Employment opportunities will peak during the construction phase and significantly decline during the operation phase. 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.

The majority of the labour force is expected to be sourced from the surrounding towns, with a man camp housing the employees during the construction phase.

Establishment of an Access Road

Access to the development area will be established for the construction and operation of Kotulo Tsatsi Energy PV1. Access to the project site is possible through the use of the existing Soafskolk Road (gravel) which is linked to the R27 located to the east of the development area. Within the development footprint itself, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). The final layout will be determined following the identification of site related sensitivities.

Undertake Site Preparation

Site preparation activities will include clearance of vegetation. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

Transport of Components and Equipment to Site

The national, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase. Some of the components (i.e. substation transformer) may be defined as abnormal loads in terms of the National Road Traffic Act (No. 93 of 1996) (NRTO)[11] by virtue of the dimensional limitations. Typical civil engineering construction equipment will need to be brought to the project site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the mounting of the PV support structures, construction of the on-site facility substation and site preparation.

[11] A permit will be required in accordance with Section 81 of the National Road Traffic Act (No. 93 of 1996) (NRTA) which pertains to vehicles and loads which may be exempted from provisions of Act.

Establishment of Laydown Areas on Site

Laydown and storage areas will be required for typical construction equipment. Once the required equipment has been transported to site, a dedicated equipment construction camp and laydown area will need to be established adjacent to the workshop area. The equipment construction camp serves to confine activities and storage of equipment to one designated area, to limit the potential ecological impacts associated with this phase of the development. The laydown area will be used for the assembly of the PV panels, and the general placement/storage of construction equipment. It is anticipated that the temporary laydown area will be included within development footprint of the solar energy facility.

Erect PV Panels and Associated Infrastructure

The construction phase involves installation of the PV solar panels, structural and electrical infrastructure required for the operation of Kotulo Tsatsi Energy PV1. In addition, preparation of the soil and improvement of the access roads are likely to continue for most of the construction phase. For PV array installations, vertical support posts will be driven into the ground. Depending on the results of the geotechnical report, a different foundation method, such as screw pile, helical pile, micropile or drilled post/piles could be used. The posts will hold the support structures (tables) on which the PV modules would be mounted. Brackets will attach the PV modules to the tables. Trenches are to be dug for the underground AC and DC cabling, and the foundations of the inverter enclosures and transformers will be prepared. While cables are being laid and combiner boxes are being installed, the PV tables will be erected. Wire harnesses will connect the PV modules to the electrical collection systems. Underground cables and overhead circuits will connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure, and ultimately the on-site facility substation.

The BESS will be constructed as part of the PV array and will require a survey of the footprint, site clearing and levelling. For Lithium-ion batteries, the battery cell packs (containing an electrolyte solution) will be brought to site as sealed units which will be installed and connected on site. MV cabling will be assembled connecting both the PV array and the BESS to the nearby substation

The establishment of the ancillary infrastructure and support buildings will require the clearing of vegetation and levelling of the development footprint, and the excavation of foundations prior to construction. Laydown areas for building materials and equipment associated with these buildings will also be required.

Undertake Site Rehabilitation

Once construction is completed and all construction equipment has been removed, the development enveloped will be rehabilitated where practical and reasonable. In addition, on full commissioning of Kotulo Tsatsi Energy PV1, any access points which are not required during operation must be closed and rehabilitated accordingly.

2.5.3 Operation Phase

Kotulo Tsatsi Energy PV1 is expected to operate for a minimum of 25 years. The facility will operate continuously, 7 days a week, and will include an integrated energy storage system. While the solar facility will be largely self-sufficient, monitoring and periodic maintenance activities will be required. Key elements of the Operation and Maintenance (O&M) plan include monitoring and reporting the performance of the solar energy facility, conducting preventative and corrective maintenance, receiving visitors, and maintaining security.

The operation phase will create approximately 65 full-time equivalent employment positions which will include low-skilled, semi-skilled and skilled personnel. Employees that can be sourced from the local municipal area include the less skilled and semi-skilled personnel (such as safety and security staff and certain maintenance crew). Highly skilled personnel may need to be recruited from outside the local area where these resources are not available within the area.

2.5.4 Decommissioning Phase

Depending on the continued economic viability of Kotulo Tsatsi Energy PV1 following the initial 25-year operation lifespan, the solar energy facility will either be decommissioned, or the operation phase will be extended. If it is deemed financially viable to extend the operation phase, existing components would either continue to operate or be dissembled and replaced with new, more efficient technology/infrastructure available at the time. If the decision is made to decommission the facility, the following decommissioning activities will take place:

Site Preparation
Site preparation activities will include confirming the integrity of the access to the site to accommodate the required decommissioning equipment.

Disassembly and removal of existing components
When the solar energy facility is ultimately decommissioned, the equipment to be removed will depend on the land use proposed for the project site at the time. All above ground facilities that are not intended for future use will be removed. Much of the above ground wire, steel, and PV panels of which the system is comprised are recyclable materials and would be recycled to the extent feasible. The components of the solar energy facility would be de-constructed and recycled, or disposed of in accordance with applicable regulatory requirements. The site will be rehabilitated where required and can potentially be returned to a beneficial land-use.

Future plans for the site and infrastructure after decommissioning
The generation capacity of the facility would have degraded by approximately 15% over the 25-year operational lifespan. The solar energy facility will potentially have the opportunity to generate power for a Merchant Market operation (i.e. the client would sell power on a bid basis to the market). Another option for the site after decommissioning is for the current land used (i.e. livestock grazing) to resume.

CHAPTER 3 ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for Kotulo Tsatsi Energy PV1 as part of the EIA Process.

3.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Impact Assessment Report

This chapter of the EIA Report includes the following information required in terms of Appendix 3: Scoping of Assessment and Content of the Environmental Impact Assessment Report:

Requirement	Relevant Section
(h) a full description of the process followed to reach the proposed development footprint within the approved site, including (i) details of the development footprint alternatives considered	The details of the alternatives considered as part of the Kotulo Tsatsi Energy PV1 and as part of the EIA Phase have been included in **Section 3.2**.
(h)(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such	The details of the alternatives considered as part of the Kotulo Tsatsi Energy PV1 and as part of the EIA Phase have been included in **Section 3.2**. Where no alternatives are being considered a motivation has been included.

3.2 Alternatives Considered during the EIA Process

In accordance with the requirements of Appendix 3 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), reasonable and feasible alternatives including, but not limited to site and technology alternatives, as well as the "do-nothing" alternative should be considered. Several other solar renewable energy facilities are planned within the broader study area, supporting the suitability of the area for solar PV projects.

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

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

In this instance, 'the project' refers to Kotulo Tsatsi Energy PV1, a solar PV facility with capacity of up to 200MW$_{AC}$ and associated infrastructure proposed to be developed by an Independent Power Producer (IPP) and intended to form part of the DMRE's REIPPP Programme.

3.2.1 Consideration of Fundamentally Different Alternatives

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 DMRE's current

Integrated Resource Plan for Electricity 2010 – 2030 (IRP)[12], and will continue to be addressed as part of future revisions. In this regard, the need for renewable energy power generation from solar PV facilities has been identified as part of the technology mix for power generation in the country for the next 20 years. Therefore, fundamentally different alternatives to the proposed project are not considered within this EIA process.

3.2.2 Consideration of Incrementally Different Alternatives

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

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

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

These alternatives are discussed under the respective sub-headings below and where no alternatives are applicable, a motivation has been included.

i. Property or Location Alternatives

One solar PV and three CSP facilities have previously been authorised in the study area, which included the farm Portion 3 of Farm Styns Vley 280. The PV facility is planned to be located adjacent to the authorised 100MW Kotulo Tsatsi PV2 facility, and within an area previously authorised for Concentrated Solar Power (CSP) project infrastructure. Site-specific studies and assessments have delineated areas of potential sensitivity within the identified project site. As a result of the affected property being previously authorised for a development of a similar nature, the suitability of the land for the development of solar PV facilities has, therefore, been confirmed.

The PV infrastructure assessed in this application is in response to the Applicant's need to change the authorised generation technology for the facility located on the farm Portion 3 of Farm Styns Vley 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the solar PV facility will utilise already authorised infrastructure in this site, contributing to the rationale for considering this site for the project. The PV facility will be connected to the grid via a previously authorised grid connection solution , which consists of a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site.

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

The placement of a solar PV facility is also dependent on several other factors including, land suitability, climatic conditions (solar irradiation levels), topography, the location and extent of the study area, availability of grid connection infrastructure and the need and desirability of the project. Kotulo Tsatsi Energy (Pty) Ltd as the Applicant, considers the preferred development area as being highly favourable and suitable for the establishment of a solar PV facility due to the following site-specific favourable characteristics:

» **Land suitability:** The development area is currently used for grazing; however, this farming practice can continue in tandem with the operations of the solar PV facility once the construction and commissioning phases of the facility are complete. Sites that facilitate easy construction conditions (i.e. relatively flat topography, lack of major outcrops etc.) are also favoured due to the reduced construction activities. Based on the suitability of the development area, no alternative locations are considered.

» **Solar resource**: The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Global Horizontal Irradiation (GHI) for the study area is in the region of approximately 2240 kWh/m^2/annum. The Northern Cape Province is considered to have the highest solar irradiation values of the country and therefore enables the development of solar energy projects and the successful operation thereof. Kotulo Tsatsi Energy (Pty) Ltd has also confirmed the solar resource of the site through a meteorological and solar weather station which has been measuring the conditions of the area over the past 7 years. Based on the solar resource available, no alternative locations are considered.

» **Topography**: The region within which the project site is located can be described as flat and homogenous. Elevation across the area ranges from 940m above sea level in the west to 950m above sea level in the east. There are no prominent hills within the project site with the highest areas of elevation situated to the north east of the project site. The flat topography of the study area under investigation is considered as beneficial in terms of the construction activities that will be required. Based on the suitable and preferable topography present, no location alternatives are considered for the development.

» **Site extent:** The affected property (i.e. Portion 3 of Farm Styns Vley 280) is approximately 2560ha in extent, which is sufficient for the installation of a solar PV facility with a contracted capacity of up to 200MW$_{AC}$, while allowing for the avoidance of environmental site sensitivities. A development area of ~1797ha has been identified within the project site within which the solar PV facility will be located. The development envelope (within which the development footprint for the Kotulo Tsatsi Energy PV1 PV array plus associated infrastructure will be located) has been demarcated as an area of ~847ha, which is equivalent to 47% of the extent of the development area. The site extent is sufficient for the proposed development and therefore eliminates the need to consider alternative locations for the development. The size of the development footprint within the development envelope is approximately 810ha.

» **Site access**: The site can be readily accessed via an existing gravel access road branching off of the R27 between Kenhardt and Brandvlei, with only minor improvements to the turnoff onto the access road from the R27 required. Based on the sufficient access available for the development, no alternative locations are considered.

» **Grid access:** A key factor in the siting of any energy generation project, is a viable grid connection. The Aries Substation is located approximately 50km north-east of the development area and is proposed as the preferred grid connection point for Kotulo Tsatsi Energy PV1. The necessary grid infrastructure required to connect the project to the national grid via the Aries Substation has been assessed in a separate process[13] and the following infrastructure authorised: a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site.

» **Geographic location**: The proposed project site is located within an area which has become a node for renewable energy projects, with one PV and three CSP solar facilities authorised on and in close proximity to the project site. The proposed project site is in close proximity to a planned node for solar development, and therefore compliments planned future land use.

» **Landowner support**: The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The landowner does not view the development as a conflict with their current land use practices. The support from the landowner for the development to be undertaken on the affected property has been solidified by the provision of consent for the project to proceed on the property through the signing of a land lease agreement with the proponent, a landowners consent as per the requirements of the EIA Regulations, 2014, as well as through comments submitted in the EIA process undertaken for the project. Furthermore, the landowner had previously consented to the development of a CSP facility on the property, which this project would replace. Therefore, with the affected landowner in support of the development, no location alternatives are considered.

Based on above site-specific attributes, the proponent considers the development area located within the study area as highly preferred in terms of the development of a solar PV facility, and expects that Kotulo Tsatsi Energy PV1 will be able to draw on synergies with the projects proposed and / or currently authorised within the vicinity of the study area. As a result, no property/location alternatives are proposed as part of this EIA process.

ii. Design and Layout Alternatives

The affected property (i.e. Portion 3 of Farm Styns Vley 280) is approximately 2560ha in extent, which is sufficient for the installation of a solar PV facility with a contracted capacity of up to 200MW$_{AC}$, while allowing for the avoidance of environmental site sensitivities. A development area of ~1797ha has been identified within the project site within which the solar PV facility will be located. The development envelope (within which the development footprint for the Kotulo Tsatsi Energy PV1 PV array plus associated infrastructure will be located) has been demarcated as an area of ~847ha, which is equivalent to 47% of the extent of the development area. Findings from previous specialist field surveys and assessments, as well as the detailed specialist investigations undertaken during the EIA Phase were considered in order to

[13] The grid connection solution to connect Kotulo Tsatsi Energy PV1 to the Aries Substation has been assessed and authorised (DEFF ref 14/12/16/3/3/2/694/1). The grid connection will include a collector substation, with a switching station component and a power line of up to 132kV in capacity.

provide site specific information regarding the development area and development envelope considered for the Kotulo Tsatsi Energy PV1.

Table 3.1: A description of footprints for Kotulo Tstatsi PV1

Footprint	Description and Extent
Project Site	Full extent of Portion 3 of the Farm Styns Vley 280. Approximately 2 560ha in extent
Development Area	A smaller focus area identified within the project site based on technical preferences and environmental constraints. Approximately 1797ha in extent
Development Envelope	An area identified considering and avoiding identified environmental constraints present within the development area Approximately 847ha in extent
Development Footprint	All development infrastructure associated with Kotulo Tsatsi Energy PV1 (some authorised infrastructure of the CSP facility, including substations and power block, is located within this area). Approximately 810ha in extent

Areas to be avoided by the development were identified, specifically relating to ecological and hydrological features and sensitivities present within the project site. The identified sensitivities were utilised as a tool by the developer to identify and locate the development envelope of the PV facility (~847ha) within the development area (1797ha). This was undertaken with the aim of avoiding possible sensitive areas within the project site so as to limit impacts associated with the development which would result in unacceptable loss.

The site extent is sufficient for the proposed development and therefore reduces the need to consider alternative locations for the PV facility and the associated infrastructure. Potential environmentally sensitive areas were identified during the Scoping Phase for further detailed consideration during the current EIA Phase. The environmental sensitivities identified through the site-specific specialist studies have informed the layout design for the PV facility, ensuring that sensitive areas are avoided as far as possible. Therefore, the layout design for the PV facility is optimal from an environmental perspective.

3.2.3 Technology Alternatives

The Kenhardt area has been identified for the development of solar and wind energy renewable facilities. Few technology options are available for solar facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail in the area, so that optimality is obtained by the final site selection. Solar energy is considered to be the most suitable renewable energy technology for this area, based on the site location, ambient conditions and energy resource availability.

Solar PV was determined as the most suitable option for further assessment. The IRP (2019), excludes the procurement of power from CSP facilities until 2030, whereas new additional capacity of approximately 6 000MW will be required from solar PV facilities. Therefore, PV technology was identified as being the preferred option for the study area and consists of a lower visual profile and limited water requirements when compared to the CSP technology alternative. Given the allocations in the IRP (2019), solar PV is considered as the most appropriate technology option. Furthermore, the development of Kotulo Tsatsi Energy PV1 provides an opportunity to optimally use a site that is currently earmarked for energy

generation through making use of solar PV technology, but with reduced visual intrusion and/or impacts and reduced water use requirements.

Therefore, considering the above, no other technology alternatives are being assessed for the development of Kotulo Tsatsi Energy PV1. The development of the solar PV facility on the site is considered as the best option for the area considering the current proposed technology on the site, the ample solar resource available and the potential resource saving in terms of water requirements in an area experiencing extreme conditions.

Several solar PV technology alternatives are available, including *inter alia*:

- Bifacial PV panels.
- Monofacial PV panels.
- Fixed mounted PV systems (static / fixed-tilt panels).
- Single-axis tracking or double-axis tracking systems (with solar panels that rotate around a defined axis to follow the sun's movement).

The primary difference between PV technologies available relate to the extent of the facility, as well as the height of the facility (visual impacts); however, the potential for environmental impacts remain similar in magnitude. Fixed mounted PV systems are able to occupy a smaller extent and have a lower height when compared to tracking PV systems, which require both a larger extent of land, and are taller in height. However, both options are considered to be acceptable for implementation from an environmental perspective. Bifacial solar PV panels offer many advantages over monofacial PV panels, as power can be produced on both sides of the module, increasing total energy generation. The preference will, therefore, be determined on the basis of technical considerations and the site conditions.

The PV panels are designed to operate continuously for more than 20 years, mostly unattended and with low maintenance. The impacts associated with the construction, operation, and decommissioning of the facility are anticipated to be the same irrespective of the PV panel selected for implementation.

3.2.4 The 'Do-Nothing' Alternative

The 'Do-Nothing' alternative is the option of not constructing Kotulo Tsatsi Energy PV1. Should this alternative be selected, there would be no environmental impacts or benefits as a result of construction and operation activities associated with a solar PV facility. The 'do-nothing' alternative will therefore likely result in minimising the cumulative impact on the land associated with renewable energy development, although it is expected that pressure to develop the site for renewable energy purposes will be actively pursued due to the same factors which make the site a viable option for renewable energy development. The current land use practices would continue, and the past and current grazing pressures on the environment will continue. The 'do-nothing alternative has been assessed as part of the EIA Phase (refer to **Chapter 8** and **Chapter 10** of this draft EIA Report).

CHAPTER 4. POLICY AND LEGISLATIVE CONTEXY

This Chapter provides an overview of the policy and legislative context within which the development of a solar PV facility, such as Kotulo Tsatsi Energy PV1, is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process which may be applicable to or have bearing on the proposed project.

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

This chapter of the EIA Report includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Report:

Requirement	Relevant Section
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context	Chapter 4, as a whole, provides an overview of the policy and legislative context which is considered to be associated with the development of the solar energy facility. The regulatory and planning context has been considered at national, provincial and local levels. A description of the policy and legislative context within which Kotulo Tsatsi Energy PV1 is proposed is included in **sections 4.3, 4.4, 4.5** and **4.6.**

4.2 Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Mineral Resources and Energy (DMRE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as a solar energy facility is illustrated in **Figure 4.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of Kotulo Tsatsi Energy PV1.

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

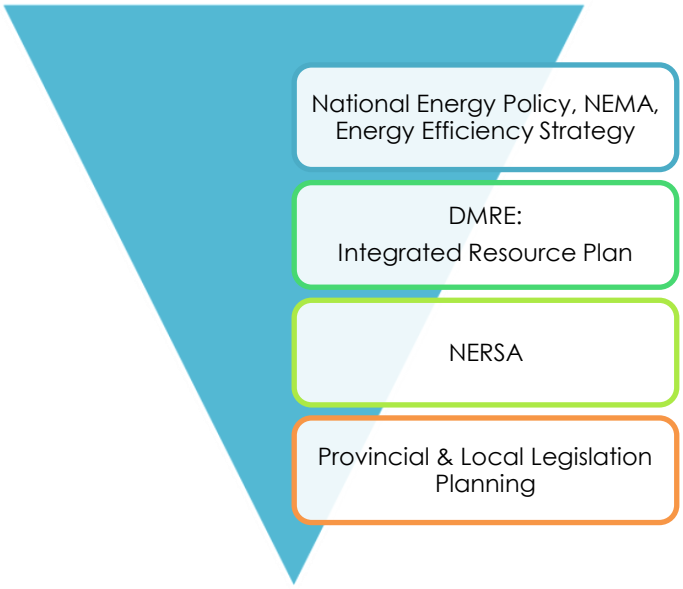

Figure 4.1: Hierarchy of electricity and planning documents

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

- **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity. Furthermore, the Department is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. Therefore, in terms of the Act, approval from the Minister is required to ensure that proposed activities do not sterilise mineral resources that may occur within the project site and development area.
- **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
- **Department of Environment, Forestry and Fisheries (DEFF):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GN R326), as amended. DEFF is the Competent Authority for this project (as per GN R779 of 01 July 2016), and is charged with granting the EA for the project under consideration.
- **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- **Department of Water and Sanitation[14]:** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is

[14] The Department of Water and Sanitation (DWS) is soon to be known as the Department of Human Settlements, Water and Sanitation (DHSWS).

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

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

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

» **Provincial Government of the Northern Cape – Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR):** This Department is the commenting authority for the EIA process for the project and is responsible for issuing of biodiversity and conservation-related permits.
» **Northern Cape Department of Transport, Safety and Liaison:** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.
» **Ngwao-Boswa Ya Kapa Bokone (NBKB):** This Department identifies, conserves and manages heritage resources throughout the Northern Cape Province.

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

4.3 National Policy

Further to the South African government's commitment in August 2011 to support the development of renewable energy capacity, the DMRE initiated the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) to procure renewable energy from the private sector in a series of rounds. To date, the Department has procured 6 422MW of renewable energy capacity from 102 independent power producers (IPPs), with 3 876MW operational and made available to the grid[16]. National policies have to be considered for the construction and operation of the solar PV facility to ensure that the development is in line with the planning of the country.

[15] The Department of Agriculture, Forestry and Fisheries (DAFF) is soon to be known as the Department of Agriculture, Rural Development and Land Reform.
[16]https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html

A brief review of the most relevant national policies is provided below in **Table 4.1**. The development of Kotulo Tsatsi Energy PV1 is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.1: Relevant national legislation and policies for Kotulo Tsatsi Energy PV1

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV1
Constitution of the Republic of South Africa, 1996	Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts.
National Environmental Management Act (No. 107 of 1998) (NEMA)	This piece of legislation is South Africa's key piece of environmental legislation and 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 state that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment. The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.
White Paper on the Energy Policy of the Republic of South Africa (1998)	The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of RE and encouraging new entries into the generation market. The policy states that the advantages of RE include, minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include, higher capital costs in some cases, lower energy densities, and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	The White Paper on Renewable Energy Policy supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of RE and aims to create the necessary conditions for the development and commercial implementation of RE technologies.

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV1
	The White Paper on RE sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing RE in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and fairly accessible and affordable coal resources. However, massive RE resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The White Paper on Renewable Energy of 2003 set a target of 10 000GWh to be generated from RE by 2013 to be produced mainly from biomass, wind, solar and small-scale hydro. The target was subsequently reviewed in 2009 during the RE summit of 2009. The policy supports the investment in RE facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing GHG emissions and the promotion of RE sources.
National Energy Act (No. 34 of 2008)	The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking environmental management requirements into account. In addition, the Act also provides for energy planning, and increased generation and consumption of Renewable Energies (REs). The Act provides the legal framework which supports the development of RE facilities for the greater environmental and social good and provides the backdrop against which South Africa's strategic planning regarding future electricity provision and supply takes place.
The Electricity Regulation Act (No. of 2006)	The Electricity Regulation Act of 2006, replaced the Electricity Act (No. 41 of 1987), as amended, with the exception of Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator (NERSA) as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which the generation, transmission, distribution, trading, and import and export of electricity are regulated.
Integrated Energy Plan (IEP), 2015	The Integrated Energy Plan (IEP) (which was developed under the National Energy Act (No. 34 of 2008)), recognises that energy is essential to many human activities, and is critical to the social and economic development of a country. The purpose of the IEP is essentially to ensure the availability of energy resources, and access to energy services in an affordable and sustainable manner, while minimising associated adverse environmental impacts. Energy planning therefore needs to balance the need for continued economic growth with social needs, and the need to protect the natural environment.
Integrated Resource Plan for Electricity (IRP) 2010-2030 (2019)	The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation. On 27 August 2018, the then Minister of Energy published a draft IRP which was issued for public comment. The lengthy public participation and consultation process has culminated in the issue of the overdue IRP 2019 which updates the energy forecast

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV1
	from the current period to the year 2030. Since the promulgated IRP 2010, the following capacity developments have taken place: » A total of 6 422MW has been procured thus far under the REIPPP Programme, with 3 876MW being currently operational and made available to the grid. In addition, IPPs have commissioned 1005MW from two (2) Open Cycle Gas Turbines (OCGT) peaking plants; and » Under the Eskom Build Programme, 1 332MW has been procured from the Ingula Pumped Storage Project, 1 588MW and 800MW from the Medupi and Kusile power stations and 100MW from the Sere Wind Farm. Provision has been made for the following new capacity by 2030: » 1 500MW of coal; » 2 500MW of hydro; » 6 000MW of solar PV; » 14 400MW of wind; » 1 860MW of nuclear; » 2 088MW of storage; » 3 000MW of gas/diesel; and » 4 000MW from other distributed generation, co-generation, biomass and landfill technologies. Based on the IRP 2019, 1 474MW has been installed for solar PV facilities, whereas, 814MW has already been procured. In addition, 1 000MW has been allocated for solar PV facilities from 2022 to 2030. This will bring the total installed capacity of solar PV facilities by 2030 to 8 288MW. Therefore, the development of the Kotulo Tsatsi Energy PV1 is supported by the IRP 2019.
National Development Plan 2030 (2012)	The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. In terms of the Energy Sectors role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes: » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of Kotulo Tsatsi Energy PV1 supports the NDP through the development of energy-generating infrastructure which will not lead to the generation of GHGs and will result in economic development and growth of the area surrounding the development area.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Commission (PICC) is integrating and phasing investment plans across 18 Strategic Integrated Projects (SIPs) which have 5

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV1
	core functions, including to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. SIP 8 of the energy SIPs supports the development of RE projects as follows: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010) and supports bio-fuel production facilities. The development of Kotulo Tsatsi Energy PV1 is aligned with SIP 8 as it constitutes a green energy initiative that would contribute clean energy in accordance with the IRP 2010 – 2030.
National Climate Change Response Policy, 2011	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. 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. 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 Kotulo Tsatsi Energy PV1 , 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.
Climate Change Bill, 2018	On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans.

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV1
	Kotulo Tsatsi Energy PV1 consists of a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

4.4 Provincial Planning and Context

A brief review of the most relevant provincial policies is provided below in **Table 4.2**. The proposed development is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.2: Relevant provincial legislation and policies for Kotulo Tsatsi Energy PV1

Relevant policy	Relevance to Kotulo Tsatsi Energy PV1
Northern Cape Provincial Spatial Development Framework (PSDF) 2012	The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the province is to enable sustainability through sustainable development. The province considers social and economic development as imperative in order to address the most significant challenge facing the Northern Cape, which is poverty. The PSDF identifies key sectoral strategies and plans which are considered to be the key components of the PSDF. Sectoral Strategy 19 refers to a provincial renewable energy strategy. Within the PSDF a policy has been included which states that renewable energy sources (including the utilisation of solar energy) are to comprise 25% of the province's energy generation capacity by 2020. The overall energy objective for the province also includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the province through appropriate financial and fiscal instruments. The development of Kotulo Tsatsi Energy PV1 supports the overall energy objective of the province to have 25% of its electricity from renewable energy sources.
Northern Cape Provincial Spatial Development Framework (PSDF) 2018 Review - Executive Summary	The review of the Northern Cape PSDF (2018) refers to infrastructure investment and that a balance must be maintained between investments aimed at meeting the social needs of communities and investment aimed at promoting economic development and job creation. The Spatial Development Strategy identified in the PSDF for basic infrastructure includes the achieving the provision of green infrastructure which includes renewable energy. As part of the Vision 2040 of the PSDF key opportunities are identified for the Province. The strengthening of the development triangle that is formed by the linking of Kimberley, Vryburg, Upington and De Aar. The development triangle sustains a diverse economy with strong mining, agricultural and renewable energy sectors. It is stated in the PSDF that a sustainable and viable economic network must be driven within the development triangle to improve the return of public investment in the Province.

Relevant policy	Relevance to Kotulo Tsatsi Energy PV1
	The development of Kotulo Tsatsi Energy PV1 will contribute to the economic network of the province specifically in terms of the renewable sector, albeit it does not fall within the development triangle.
The Northern Cape Climate Change Response Strategy	The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "*The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key. Sectors to ensure proactive long-term responses to the frequency and intensity of extreme weather events such as flooding and wildfire, with heightened requirements for effective disaster management*". Key points from the MEC address include the NCPG's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the Northern Cape Province's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The development of Kotulo Tsatsi Energy PV1 will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape.

4.5 Local Policy and Planning Context

The local tiers of government relevant to the Kotulo Tsatsi Energy PV1 project are the Hantam Local Municipality and the Namakwa District Municipality. Instruments and/or policies at both the district and local level contain objectives which align with the development of Kotulo Tsatsi Energy PV1. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 4.3: Relevant district and local legislation and policies for Kotulo Tsatsi Energy PV1

Relevant policy	Relevance to Kotulo Tsatsi Energy PV1
Namakwa District Municipality (NDM) Integrated Development Plan (2017-2022)	The mission statement for the NDM is summarised by the following aspects: » The stimulation of radical economic and social transformation; » The fostering of partnership with relevant role-players; » Supporting and capacitating of local municipalities; » Transparent and accountable processes; and » Providing of local leadership. The key priority issues listed in the Namakwa District Municipality's Integrated Development Plan (NDM:IDP) include: » Basic service delivery; » Municipal institutional development and transformation; » Local economic development;

Relevant policy	Relevance to Kotulo Tsatsi Energy PV1
	» Municipal financial viability and management; » Good governance and public participation. The development goals listed in the IDP that are relevant to the development of Kotulo Tsatsi Energy PV1 include: » To deliver a positive contribution to the sustainable growth and development within its boundaries and the rest of the Northern Cape; » The creation of a healthy and environmentally friendly environment within and outside of the Councils' district boundaries, must be attempted; » The promotion of human resources within and outside the organisation through training and the implementation of new technological aids. Linked to the developmental goals are a number of developmental objectives. The following objectives are relevant to the development of Kotulo Tsatsi Energy PV1 : » Promotion of SMMEs in order to strengthen the Local Economic Sector; » Promote the infrastructure development, including electricity.
Hantam Local Municipality Integrated Development Plan (IDP) 2020/2021 (Final, May 2020)	The Hantam LM IDP indicates that there has been a significant increase in the electricity, gas and water sector due to the establishment of renewable energy generation facilities in the municipal area. The IDP also reports that there has been an increase in the construction and transport sectors due to strong linkages with the establishment of renewable energy facilities. The municipality considers that the establishment of renewable energy projects in the region will positively impact on the economy of the municipal area. Therefore, the development of Kotulo Tsatsi Energy PV1 is desirable by the local municipality due to the alignment with the IDP.

4.6 International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of Kotulo Tsatsi Energy PV1 are provided below in **Table 4.4**. Kotulo Tsatsi Energy PV1 is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.4: International policies relevant to Kotulo Tsatsi Energy PV1

Relevant policy	Relevance to Kotulo Tsatsi Energy PV1
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	Following COP24 held in Katowice, Poland, and Chile's announcement that they could not host the next COP, nearly 27 000 delegates met in Madrid, Spain for COP25 with the intention to finalise the 'rulebook' of the Paris Agreement. The Conference also intended to communicate to the global community that the efforts of the United Nations (UN) to curb climate change remained relevant and that the UN recognised the yawning gap between current progress and global goals to limit global warming. The UNFCCC Secretariat announced[17] on 29 May 2020 that COP 26, originally scheduled for 9 – 19 November 2020 was postponed for 1 – 12 November 2021 and will be

[17] https://cei.org/blog/cop-26-un-climate-conference-delayed%C2%A0until-november-2021

Relevant policy	Relevance to Kotulo Tsatsi Energy PV1
	held in Glasgow, Scotland. In the previous COP, talks between the parties were unable to reach consensus in many areas, with a lot of issues being postponed to COP26 in 2021. Although COP26 has been postponed, the provision in the 2015 Climate Treaty that each Party must take a more ambitious commitment in 2020 to reduce greenhouse emissions has not been postponed. The UN at COP25 expressed their dissatisfaction with the results of the Conference and that the global community lost out on an opportunity to show increased ambition on mitigation, adaptation and finance to tackle the climate crisis [18]. The policy provides support for Kotulo Tsatsi Energy PV1 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 4 (October 2020)	The Equator Principles (EPs) 4 constitute a financial industry benchmark used for determining, assessing, and managing project's environmental and social risks. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are applicable to large infrastructure projects (such as Kotulo Tsatsi Energy PV1) and apply globally to all industry sectors. Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of Kotulo Tsatsi Energy PV1. 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. Kotulo Tsatsi Energy PV1 is currently being assessed in accordance with the requirements of the EIA Regulations, 2014, as amended (GN R326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.
International Finance Corporation (IFC) Performance Standards and Environmental and Social Sustainability (January 2012)	The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012. Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an ESMS appropriate to the nature and scale of the project, and commensurate with the level of its environmental and

[18] https://www.carbonbrief.org/cop25-key-outcomes-agreed-at-the-un-climate-talks-in-madrid

Relevant policy	Relevance to Kotulo Tsatsi Energy PV1
	social risks and impacts, be established and maintained. The above-mentioned standard is the overarching standard to which all the other standards relate. Performance Standard 2 through to 8 establish specific requirements to avoid, reduce, mitigate or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS consistent with Performance Standard 1. Given the nature of Kotulo Tsatsi Energy PV1, it is anticipated (at this stage of the process) that Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project.

CHAPTER 5. NEED AND DESIRABILITY

Appendix 3 of the 2014 EIA Regulations (GNR 326) requires that an EIA Report include a motivation for the need and desirability of 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 needs to consider whether it is the right time and the right place for locating the type of land-use/activity being proposed. Need and desirability must consider the wise use of land, and should be able to answer the question of what the most practicable and/sustainable use of land is.

This Chapter provides an overview of the projected suitability of Kotulo Tsatsi Energy PV1 being developed at the preferred project location from an international, national, regional, and site-specific perspective. It provides an overview of the need and desirability, and perceived benefits of the project specifically.

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

This chapter includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Report:

Requirement	Relevant Section
(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 for the development of Kotulo Tsatsi Energy PV1 is included and discussed as a whole within this chapter. The need and desirability for the development of the solar PV facility has been considered from an international, national, regional and site-specific perspective.

5.2 Need and Desirability from an International Perspective

The need and desirability of Kotulo Tsatsi Energy PV1, from an international perspective, can be described through the project's alignment with internationally recognised and adopted agreements, protocols and conventions. South Africa is a signatory to a number of international treaties and initiatives, including the United Nation's Development Programme's (UNDP's) Sustainable Development Goals (SDGs). The SDGs address global socio-economic challenges such as poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanisation, environment and social justice. The SDGs consist of 17 global goals set by the United Nations. The 17 SDGs are characterised by 169 targets, and 304 indicators.

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

Targets	Indicators
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services.	7.1.1 Proportion of population with access to electricity. 7.1.2 Proportion of population with primary reliance on clean fuels and technology.

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

The development of Kotulo Tsatsi Energy PV1 would contribute positively towards Goal 7 of the SDGs through the following:

- By generating up to 200MW_{AC} of affordable and clean energy.
  - A study published by the CSIR on 14 October 2016 ("Cost of new power generators in South Africa Comparative analysis based on recent Independent Power Producer (IPP) announcements", Dr Tobias Bischof-Niemz and Ruan Fourie) which took into consideration the results of the cost prices bid successfully under the Department of Mineral Resources and Energy's Renewable Energy (RE) IPP and Coal Baseload IPP Procurement Programmes, found that solar PV and wind were 40% cheaper than new baseload coal (i.e. R0.62/kWh for PV and wind vs R1.03 for coal).
  - PV technology is one of the cleanest electricity generation technologies, as it does not result in the release of emissions during its operation.
- By contributing towards South Africa's total generation capacity, specifically through the utilisation of renewable energy resources.

The Kyoto Protocol (1997) is also relevant to the need of the development of PV1 from an international perspective. The protocol calls for the reduction of South Africa's greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. The development of PV1 will add capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements, as set out in the protocol, through the generation of energy without the emission of greenhouse gasses.

5.3 Need and Desirability from a National Perspective

Kotulo Tsatsi Energy PV1 is proposed in specific response to a National Government initiative, the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). This programme was initiated in order to give effect to the requirements of the IRP with regards to renewable energy targets. As a result, the need and desirability of Kotulo Tsatsi Energy PV1 from a national perspective can largely be linked from the project's alignment with national government policies, plans, and programmes which have relevance to

energy planning and production (as discussed in detail in **Chapter 4**). The following key plans have been developed by National Government to consider South Africa's current energy production, projected future demands, and provide the necessary framework within which energy generation projects can be developed:

» Integrated Energy Plan (IEP)
» Integrated Resource Plan (IRP)

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

The IEP is intended to provide a roadmap of South Africa's future energy landscape and guide future energy infrastructure investments and policy development. The Plan considered the three pillars of sustainable development, and list the following as the eight key energy planning objectives:

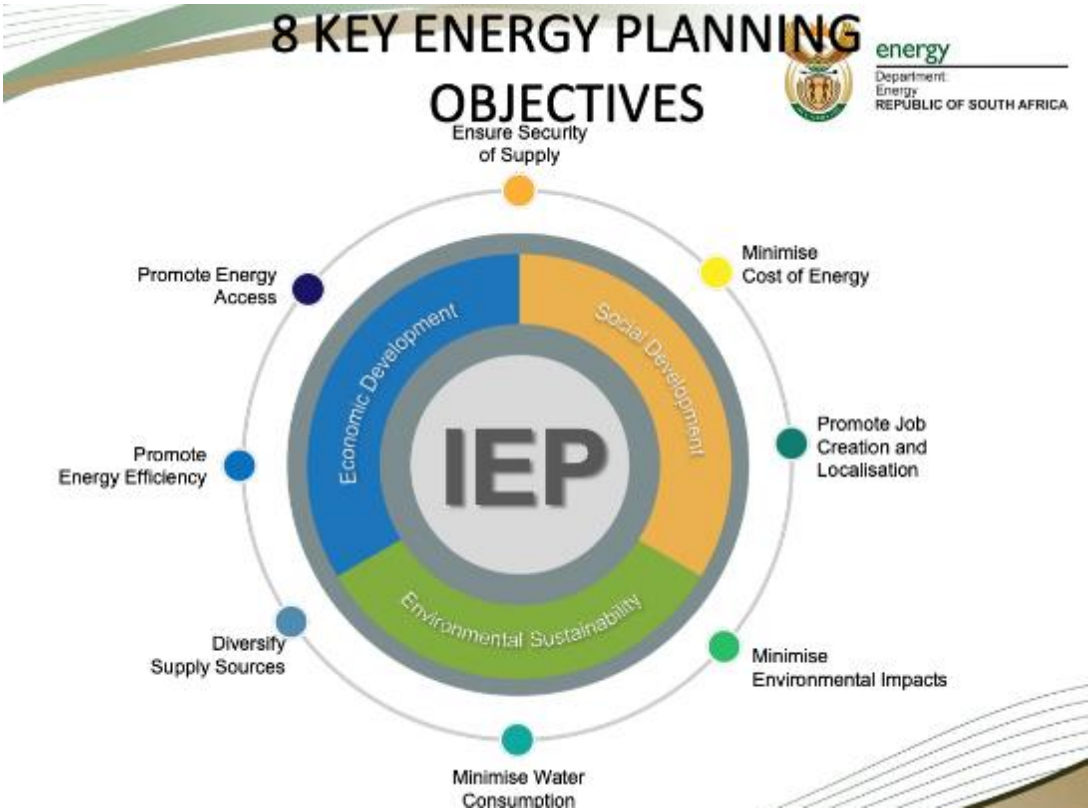

Figure 5.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

The latest iteration of the IEP (25 November 2016) contained the following statement regarding solar power in South Africa:

"*South Africa experiences some of the highest levels of solar radiation in the world and this renewable resource holds great potential for the country. The daily solar radiation in South Africa varies between 4.5*

and 6.5 kilowatt hours per square meter (kWh/m²) (16 and 23 mega joules per square meter [MJ/m²]) (Stassen, 1996), compared to about 3.6 kWh/m² in parts of the United States and about 2.5 kWh/m² in Europe and the United Kingdom. The total area of high radiation in South Africa amounts to approximately 194 000 km², including the Northern Cape, which is one of the best solar resource areas in the world. With electricity production per square kilometre of mirror surface in a solar thermal power station being 30.2 MW, and just 1% of the high radiation area in the country being made available for solar power generation, the generation potential is approximately 64 GW. Solar energy has the potential to contribute quite substantially to South Africa's future energy needs. This would, however, require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres."

In terms of electricity generation, the IEP states that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources, and includes the following statement regarding solar energy's contribution to the diversified energy mix:

- *Solar should play a much more significant role in the electricity generation mix than it has done historically and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV. Solar PV includes large scale installations for power generation which supply to the grid and individual, off-grid solar home systems and rooftop panels.*
- *Several interventions which could enhance the future solar energy landscape are recommended as follows: –Large scale CSP projects with proven thermal storage technologies and hybridisation / industrial steam application projects should be incentivised in the short to medium term. In the long term, the existing incentives could be extended to promote locally developed CSP technology storage solutions and large-scale solar fuel projects.*
- *A thorough solar resource assessment for South Africa should continue to be undertaken in the Northern Cape Province and extended to other provinces deemed to have high solar radiation levels.*
- *Investments should be made to upgrade the grid in order to accommodate increasing solar and other renewable energy contributions.*

The Integrated Resource Plan 2019 is South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. The consideration of GHG emissions in the determination of the energy generation mix indicates government's commitment to international obligations under the Paris Agreement.

A number of IPP Procurement Programmes have been initiated to secure electricity generated from a range of resources from the private sector (i.e. from Independent Power Producers, or IPPs). Under these Programmes, IPPs are invited to submit proposals for the finance, construction, operation, and maintenance of electricity generation facilities for the purpose of entering into an Implementation Agreement with the DMRE and a Power Purchase Agreement (PPA) with Eskom as the buyer. Provision has been made for new additional capacities in the IRP 2019 (refer to **Table 5.1**).

Table 5.1: Overview of the total installed capacity expected by 2030

IPP Procurement Programme	Technology	MW	Total
Renewables	Wind	17 742MW	31 320MW
	Solar CSP	600MW	
	Solar Photovoltaic	8 288MW	
	Hydro	4 600MW	
Coal	Coal	33 364MW	33 364MW
Nuclear	Nuclear	1 860MW	1 860MW
Gas & Diesel	Gas & Diesel	3 000MW	3 000MW
Other (Distributed Generation, CoGen, Biomass, Landfill)	Other (Distributed Generation, CoGen, Biomass, Landfill)	4 000MW	4 000MW

Renewable resources are valuable in contributing towards electricity generation and diversifying South Africa's electricity mix, while contributing towards South Africa's response to Climate Change. Under the REIPPPP, the DMRE intends to secure 14 725MW of electricity from renewable energy generation facilities utilising either onshore wind, concentrated solar thermal, solar photovoltaic (PV), biomass, biogas, landfill gas, or hydro across a number of bidding windows, while simultaneously contributing towards socio-economic development. A total of 1 474MW[19] of PV generated electricity has been awarded to preferred bidders across four (4) rounds of bidding to date, with 814MW still remaining to be allocated in subsequent bidding rounds. Preferred bidders identified under any IPP Procurement Programme, including the REIPPPP, are required to satisfy a number of economic development requirements, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-economic development. In addition to electricity generation and supply, IPP Procurement Programmes also contribute positively towards socio-economic development of a region, over and above job creation.

In addition to the policy considerations detailed above, Government has prioritised post COVID-19 turnaround plans in terms of renewable energies within the Just Energy Transition (JET), coupled with key development objectives of the various spheres of government. These policies share the same ideals, such as:

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

Government has compiled an Economic Reconstruction and Recovery Plan which was presented to Parliament in October 2020. According to this plan, the economic survey will rely on a massive investment

[19] https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html

in infrastructure, including energy, telecommunications, ports and rail. The core elements of the Economic Reconstruction and Recovery Plan are as follows:

1. Priority interventions for economic recovery: the plan sets out eight priority interventions that will ignite South Africa's recovery and reconstruction effort. These are the flagship initiatives that all of society will rally around to build a new economy (refer to **Figure 5.2**).
2. Enabling conditions for growth: these are growth-enhancing reforms and other preconditions for an inclusive, competitive and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery requires careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution, and is supported by enhanced institutional arrangements to ensure implementation and accountability.

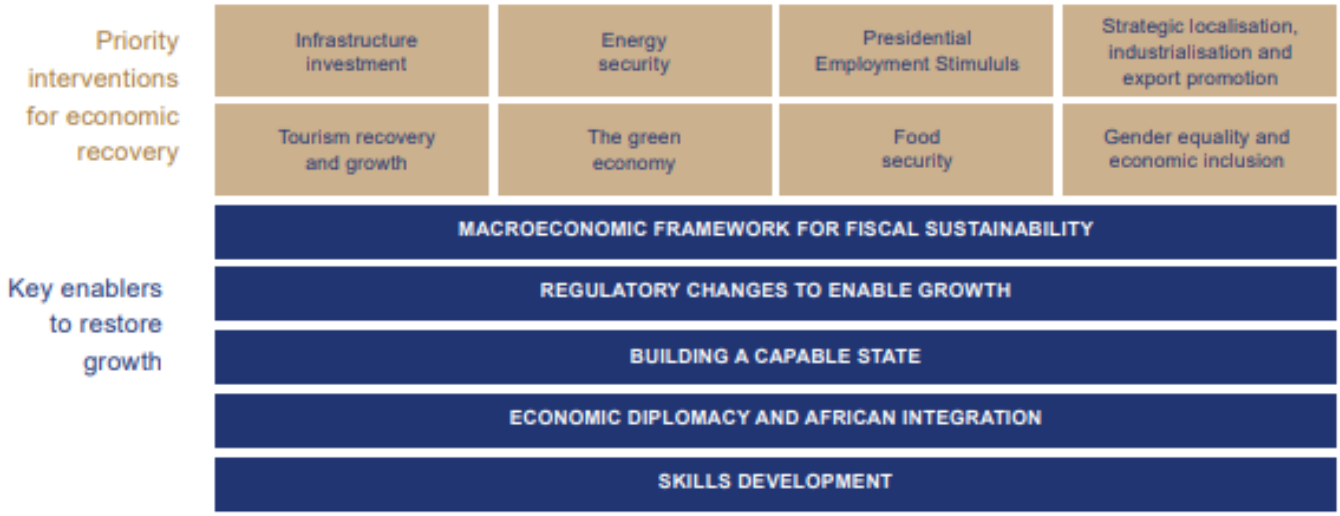

Figure 5.2: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

The plan recognises energy security as the most important prerequisite for the recovery agenda and states that renewed investment in a diversified energy mix can be achieved within a short time horizon, while alleviating a crippling energy crisis and facilitating a necessary transition to a less carbon-intensive economy. One of the key commitments of the plan is, therefore, to implement the IRP 2019 without delay to provide a substantial increase in the contribution of renewable energy sources by 2030, alongside other sources including battery storage, gas and clean coal. The transition to green energy is recognised as contributing towards the realisation of the low-carbon, climate-resilient and inclusive economy envisaged by the National Development Plan. The development of PV1 is identified as a mechanism for securing additional power generation capacity as part of the REIPPP programme or for private off-takers, reducing the reliance for electricity on Eskom.

The need for new power generation from solar PV facilities has been identified and assessed by government at a national scale considering the national energy requirements as well as international commitments under the Paris Agreement; therefore, provision has been made for the inclusion of new PV power generation capacity in South Africa's energy mix. The implementation of Kotulo Tsatsi Energy PV1 has the potential to contribute positively towards the identified need, while simultaneously contributing to job creation and

socio-economic development, identified as a need for the country within the National Development Plan (NDP).

Kotulo Tsatsi Energy PV1 will make use of renewable energy technology and would contribute positively towards reducing South Africa's GHG emissions and ensure compliance with all applicable legislation and permitting requirements. In addition, by making use of PV technology, Kotulo Tsatsi Energy PV1 would have reduced water requirements when compared with some other generation technologies in alignment with one of the vision 2030 themes of the then-Department of Water and Sanitation's (now the Department of Human Settlements, Water and Sanitation) National Water Resource Strategy 2 (2013) (i.e. transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

5.4 Need and Desirability of the project from a Regional Perspective

South Africa's electricity generation mix has historically been dominated by coal. However, up to 2030 a new capacity demand will be driven by the decommissioning of existing coal-fired power stations. A further 24 100MW of coal power is expected to be decommissioned in the period 2030 to 2050 (refer to **Figure 5.2**). Therefore, additional capacity will be required from renewable energy sources, particularly solar with 6 000MW being allocated for the period up to 2030.

	Coal	Coal (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1 860	2,100	2 912	1 474	1 980	300	3 830	499
2019	2,155	-2,373					244	300		Allocation to the extent of the short term capacity and energy gap
2020	1,433	-557				114	300			
2021	1,433	-1403				300	818			
2022	711	-844			513	400 1,000	1,600			
2023	750	-555				1000	1,600			500
2024			1,860				1,600		1000	500
2025						1000	1,600			500
2026		-1,219					1,600			500
2027	750	-847					1,600		2000	500
2028		-475				1000	1,600			500
2029		-1,694			1575	1000	1,600			500
2030		-1,050		2,500		1000	1,600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

Installed Capacity
Committed/Already Contracted Capacity
Capacity Decommissioned
New Additional Capacity
Extension of Koeberg Plant Design Life
Includes Distributed Generation Capacity for own use

- 2030 Coal Installed Capacity is less capacity decommissioned between years 2020 and 2030.
- Koeberg power station rated/installed capacity will revert to 1,926MW (original design capacity) following design life extension work.
- Other/ Distributed generation includes all generation facilities in circumstances in which the facility is operated solely to supply electricity to an end-use customer within the same property with the facility.
- Short term capacity gap is estimated at 2,000MW.

Figure 5.2: A snapshot of the updated Energy Mix as per the IRP 2019

Although the majority of South Africa's electricity generation infrastructure (coal-fired power stations) is currently located within Mpumalanga due to the location of coal resources within this province, the Northern Cape Province has been identified as an area where electricity generation from solar energy facilities is highly feasible and a viable option. The location of the study area and project site within the Northern Cape is therefore considered to support the Province/Region's generation targets. The Kenhardt area is also considered as a hub for the development of solar energy projects due to the viability of the solar resource for the area and the number of projects proposed in the area.

The overarching objective for the solar energy facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. From a regional site selection perspective, this region is considered to be preferred for solar energy development by virtue of its annual solar irradiation values. The GHI for the area derived from the World Bank Group's Global Solar Atlas is approximately 2 240 kWh/m^2/annum, equivalent to the highest GHI values in the country (refer to **Figure 5.3**).

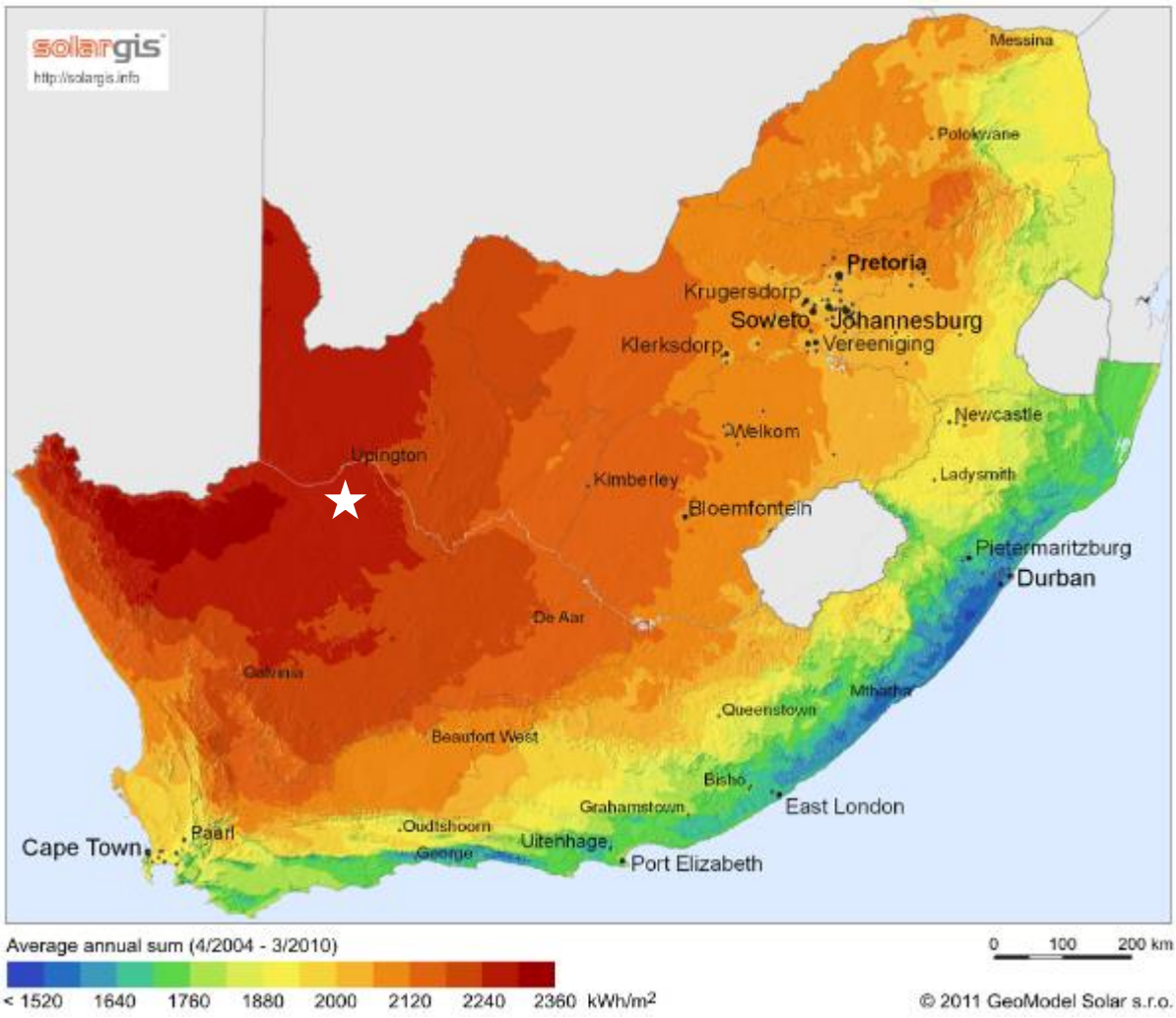

Figure 5.3: Solar irradiation map for South Africa, with the position of Kotulo Tsatsi Energy PV1 shown by the white star (Source: GeoModel Solar)

5.5 Receptiveness of the proposed development area for the establishment of Kotulo Tsatsi Energy PV1

The placement of a solar PV facility is strongly dependent on several factors including climatic conditions (solar irradiation levels), topography, the location of the site, and in particular the location in a node for renewable projects, availability of grid connection, the extent of the site and the need and desirability for the project. From a local level perspective, the project site and development area have specifically been identified by the proponent as being highly desirable from a technical perspective for the development of a solar PV facility due to the following site characteristics:

» **Solar resource**: The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values. The Global Horizontal Irradiation (GHI) for this geographic location is in the region of approximately 2 240kWh/m^2/annum, which is considered favourable for the development of a solar PV facility.

» **Topography**: Sites that facilitate easy construction conditions, (i.e. relatively flat topography, lack of major rock outcrops, limited watercourse crossings, etc.) are favoured by developers during the site selection process. As a result, the development area for Kotulo Tsatsi Energy PV1 consists of a flat and homogenous area. Elevation across the area ranges from 940m above sea level in the west to 950m above sea level in the east. There are no prominent hills within the project site with the highest areas of elevation situated to the north east of the project site. These characteristics are preferred for the construction and operation of a solar PV facility such as Kotulo Tsatsi Energy PV1.

» **Site extent and land availability:** Availability of relatively level land of sufficient extent can be a restraining factor to solar facility development, as a 200MW PV facility and associated infrastructure can require ~600ha of land space. The affected property (i.e. project site) is approximately 2560ha in extent, which is sufficient for the development of a solar PV facility with a contracted capacity of up to 200MW, while allowing for the avoidance of environmental sensitivities. A development area of ~ 1797ha has been identified within the project site within which the solar PV facility will be sited. The development envelope (within which the development footprint for the Kotulo Tsatsi Energy PV1 PV array plus associated infrastructure will be placed) has been demarcated as an area of ~847ha, which is equivalent to 47% of the extent of the development area. The extent of land available for the construction and operation of Kotulo Tsatsi Energy PV1, and the opportunity provided for the avoidance of environmental sensitivities contributes to the need and desirability of the development of Kotulo Tsatsi Energy PV1 in the proposed location. Furthermore, taking into consideration that the authorised Kotulo Tsatsi PV2 solar PV facility is located within the same project site and directly to the west of the Kotulo Tsatsi Energy PV1 development area, also adds to the desirability of the proposed development in the proposed location.

Table 5.2: Description of footprints for Kotulo Tsatsi PV1

Footprint	Description and Extent
Project Site	Full extent of Portion 3 of the Farm Styns Vley 280. Approximately 2 560ha in extent
Development Area	A smaller focus area identified within the project site based on technical preferences and environmental constraints. Approximately 1797ha in extent
Development Envelope	An area identified considering and avoiding identified environmental constraints present within the development area Approximately 847ha in extent
Development Footprint	All development infrastructure associated with Kotulo Tsatsi Energy PV1 (some authorised infrastructure of the CSP facility, including substations and power block, is located within this area). Approximately 810ha in extent

» **Access to Road Infrastructure and Site access**: The development area can be readily accessed via an existing gravel access road (Soafskolk road) branching off of the R27 between Kenhardt and Brandvlei, with only minor improvements to the turnoff onto the access road from the R27 required. The R27 road

provides access to the town of Kenhardt via the N14 from Upington. The proximity of the development area to the R27 road (refer to **Figure 5.4**) decreases the impact on secondary roads from traffic during the construction and operation phases. As material and components would need to be transported to the development area during the construction phase, accessibility to the project site is a key factor in determining the viability of Kotulo Tsatsi Energy PV1, particularly taking transportation costs (direct and indirect) into consideration and the impact of this on the project economics and the ability to submit a competitive bid under the DMRE's REIPPP Programme.

Figure 5.4: Existing road infrastructure within the vicinity of the development area for Kotulo Tsatsi Energy PV1. This infrastructure will primarily be used to gain access to the development area.

» **Grid access:** A key factor in the siting of any solar PV facility is that the project must have a viable grid connection in order to evacuate the generated electricity to the national grid. The grid connection point for Kotulo Tsatsi Energy PV1 will be the existing Aries Substation. The solar PV facility will be connected to the grid via the previously authorised grid connection solution (refer to **Figure 5.5**), which consists of a collector substation, switching station and a power line to the Aries Substation located 50km north-east of the site.

» **Land suitability and land use activities:** The current land use of the development area is an important consideration in site selection in terms of limiting disruption to existing land use practices. The project site is currently used for grazing, which is generally preferred for developments of this nature as the grazing activities can continue on the project site in tandem with the operation of the solar PV facility. There is no cultivated agricultural land in the project site or directly adjacent to it which could be impacted upon by the proposed development. The development area is not optimal for agricultural land use activities restricted by the arid climate and shallow soils, limiting the overall potential of the site to very low and rendering a low carrying capacity for livestock. The landowner is currently considering alternative land uses based on the challenges and limitations experienced within the area from a climatic perspective. Other land uses present within the vicinity of the development area include power line servitudes (including the existing Aries-Helios 400kV line), and the future development of other renewable solar

energy facilities which have received environmental authorisations from DEFF. The proposed development is compatible with the surrounding land uses and does not present a conflicting land use.

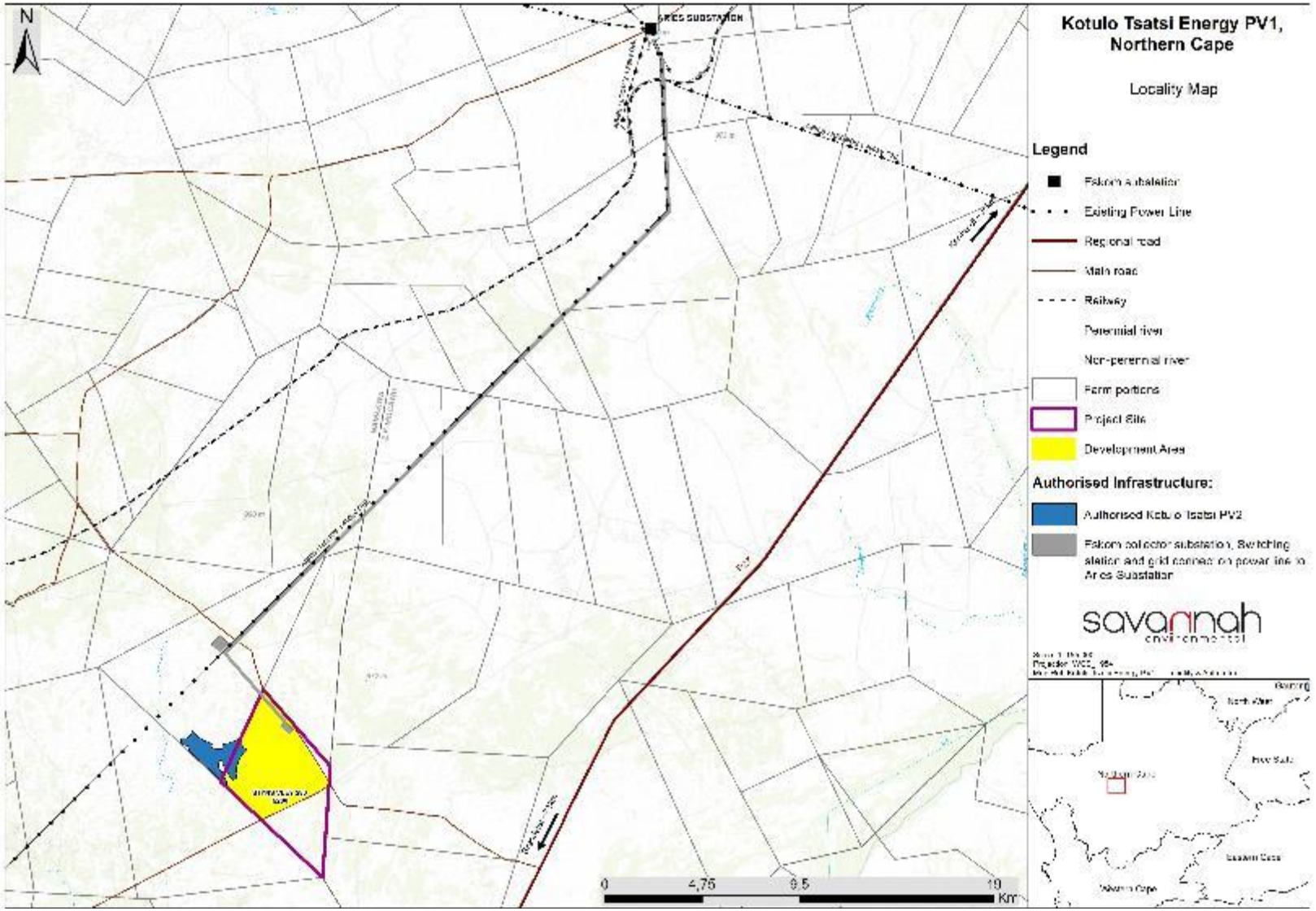

Figure 5.5: Previously authorised grid connection solution to cater for the connection of Kotulo Tsatsi Energy PV1 to the national grid (**Appendix O**)

» **Landowner Support:** The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The landowner does not view the development as a conflict with their current land use practices. The support from the landowner for the development to be undertaken on the affected property has been solidified by the provision of consent for the project to proceed on the property through the signing of a land option to lease agreement with the proponent.

Taking into consideration the solar resource, grid access, land suitability, landowner support, access to road infrastructure, the current land use of the project site and development area, in conjunction with other large-scale solar PV and CSP projects that have been authorised within the vicinity of the project site, the development of Kotulo Tsatsi Energy PV1 is therefore considered to be desirable and will ultimately contribute to, and further develop the successful power generation activities already being undertaken within the area.

Therefore, the development of Kotulo Tsatsi Energy PV1 within the project site and development area is considered to be desirable considering the characteristics of the area.

5.6 Benefits of Renewable Energy and the Need and Desirability

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

Socio-economic upliftment of local communities: Kotulo Tsatsi Energy PV1 has the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. In terms of the needs of the local community, the Local and District municipality IDPs identified the need to facilitate economic development by creating an environment that is conducive for business development, economic growth, sustainable employment opportunities and growth in personal income levels of communities; unlock opportunities to increase participation amongst all sectors of society in the mainstream economy to create decent job opportunities; promote Local Economic Development; and enhance rural development and agriculture. A study undertaken by the Department of Mineral Resource and Energy (DMRE), National Treasury and the Development Bank of Southern Africa (DBSA) in June 2017 found that employment opportunities created during the construction phase of the projects implemented to date had created 40% more jobs for South African citizens than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned, confirming the potential benefits for local communities associated with the implementation of renewable energy projects.

Kotulo Tsatsi Energy PV1 also has the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPPP, the project will commit benefits to the local community in the form of job creation, localisation, and community ownership. In accordance with the DMRE's bidding requirements of the REIPPP, a percentage of the revenue generated per annum during operation will be made available to local communities through a social beneficiation scheme. Therefore, the potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and

services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment.

Increased energy security: Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. As a result of the power constraints in the first half of 2015, power generators meant to be the "barely-ever-used" safety net for the system (diesel-fired gas turbines) were running at >30% average load factor in the first half of 2015. Load shedding occurred during 82 days in the first half of 2015 (out of 181 days). Results of a CSIR Energy Centre study for the period January to June 2015 (CSIR, August 2015), concluded that the already implemented renewable projects (wind and solar) within the country avoided 203 hours of so-called 'unserved energy'. During these hours the supply situation was such that some customers' energy supply would have had to be curtailed ('unserved') had it not been for the renewables. The avoidance of unserved energy cumulated into the effect that for 15 days, from January to June 2015, load shedding was avoided entirely, delayed, or a higher stage of load shedding prevented due to the contribution of renewable wind and PV projects[20]. More recently, power generated from renewable energy sources have assisted Eskom in alleviating the need for rolling black-outs when aging power stations have been offline for maintenance.

Resource saving: It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability. Renewable energy also translates into revenue savings, as fuel for renewable energy facilities is free, while compared to the continual purchase of fuel for conventional power stations. Results of a CSIR Energy Centre study for January – June 2015 (CSIR, August 2015) have quantified the contribution from renewable energy to the national power system and the economy over the first 6 months of 2015 compared to the 12 months of 2014:

2015 (6 months)	2014 (12 months)
R3.60 billion saving in diesel and coal fuel costs	R3.64 billion saving in diesel and coal fuel costs
200 hours of unserved energy avoided, saving at least an additional R1.20 billion–R4.60 billion for the economy	120 hours of unserved energy avoided, saving at least an additional R1.67 billion for the economy
Generated R4.0 billion more financial benefits than cost	Generated R0.8 billion more financial benefits than cost

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

Economics: As a result of the available renewable energy resources and the competitive renewable energy procurement process, both wind power and solar PV power have now been proven as cheaper forms of energy generation in South Africa than fossil fuel (coal) generated power. The IRP 2019 gazetted by the Minister of Mineral Resources and Energy in October 2019, updates the energy forecast for South

[20] (http://ntww1.csir.co.za/plsql/ptl0002/PTL0002_PGE157_MEDIA_REL?MEDIA_RELEASE_NO=7526896)

Africa from the current period until the year 2030 and has made an allocation of 6000MW in addition to the already installed/committed capacity of 2 288MW from solar PV facilities which will be developed from 2022 – 2030.

Pollution reduction: The release of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation. The use of solar irradiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of GHG emissions. South Africa is estimated to currently be responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. Since its inception, the REIPPPP has achieved carbon emission reductions[21] of 25.3 million tonnes of CO_2 (IPP Office, March 2018). The development of Kotulo Tsatsi Energy PV1, and the associated electricity generated as a result of the facility, will result in considerable savings on tons of CO_2 emissions.

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

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa.
In the short 8-year period, the REIPPPP has attracted R209.4 billion in committed private sector investment, resulting in 38 701 jobs for the youth and women from surrounding communities[22]. It is estimated that during the construction phase (for the period of 12-18 months) approximately ~200-250 employment opportunities will be generated for the PV facility, and that approximately 35-40 jobs will be generated for the lifetime of the project during its operation.

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

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

Protecting the natural foundations of life for future generations: Actions to reduce our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic

[21] Carbon emission reduction is calculated based on a displacement of power, from largely coal-based to more environmentally friendly electrical energy generation, using a gross Eskom equivalent emissions factor of 1.015 tons CO_2/MWh.
[22] https://www.sanews.gov.za/south-africa/renewable-energy-programme-attracts-r2094-billion-sa-economy

climate change, thereby securing the natural foundations of life for generations to come; this is the basis of sustainable development. The development of renewable energy facilities contributes to the protection of the foundations.

CHAPTER 6. APPROACH TO UNDERTAKING THE EIA PROCESS

In terms of the EIA Regulations of December 2014 (as amended) published in terms of the NEMA (Act No. 107 of 1998), as amended, the construction and operation of Kotulo Tsatsi Energy PV1 is a listed activity requiring Environmental Authorisation (EA). The application for EA is required to be supported by an Environmental Impact Assessment (EIA) process based on the contracted capacity of the facility being 200MW and Activity 1 of Listing Notice 2 (GNR 325).

An EIA process refers to the process undertaken in accordance with the requirements of the relevant EIA Regulations (the 2014 EIA Regulations (GNR 326), as amended), which involves the identification and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project or activity. The EIA process comprises two main phases: i.e. **Scoping** and **EIA Phase**. The EIA process culminates in the preparation and submission of a final EIA Report (including an EMPr) to the competent authority for decision-making. In order to ensure that a comprehensive assessment is provided to the competent authority and I&APs regarding the impacts of the facility, detailed independent specialist studies were undertaken as part of the BA process.

The EIA process is illustrated in **Figure 6.1**.

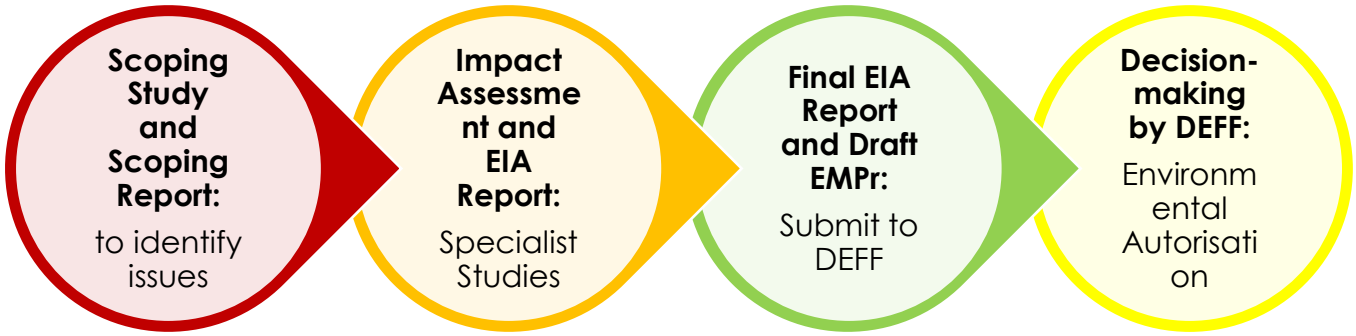

Figure 6.1: The Phases of an Environmental Impact Assessment (EIA) Process

South Africa has been subject to the enforcement of Government Gazette 43096 which places the country in a national state of disaster limiting the movement of people to curb the spread of the COVID-19 virus. The status of national state of disaster was still relevant at the commencement of the EIA phase. Considering the limitations in place, a comprehensive consultation process was designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which included I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders, while remaining within the limits as stipulated by the National Government. This chapter serves to outline the process that was followed during the EIA process.

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

This chapter includes the following information required in terms of Appendix 3: Scoping of Assessment and Content of Environmental Impact Assessment Report:

Requirement	Relevant Section
(d) a description of the scope of the proposed activity, including (i) all listed and specified activities triggered and being applied for and (ii) a description of the associated structures and infrastructure related to the development.	All listed activities triggered as a result of the development of the project 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.
(h)(ii)details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	A public participation plan was prepared and approved by the DEFF (**Appendix C9**). The public participation process followed throughout the EIA process of Kotulo Tsatsi Energy PV1 is included in **Section 6.5.2** and copies of the supporting documents and inputs are included in **Appendix C**.
(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	All comments received from the commencement of the EIA process has been included and responded to in the Comments and Responses (C&R) Report (**Appendix C8**). All comments raised during the 30-day review and comment period of the EIA Report and through on-going consultation with I&APs are included and responded to as part of a C&R report (**Appendix C8** submitted as part of the Final EIA Report to DEFF for decision-making).
(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks included in **Section 6.7**

6.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to Kotulo Tsatsi Energy PV1, as identified at this stage in the process and considered within this EIA process, are described in more detail under the respective sub-headings. Additional permitting requirements are detailed within **Section 6.6**.

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

NEMA (No. 107 of 1998) 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 Environmental Authorisation (EA). Due to the fact that Kotulo Tsatsi Energy PV1 is a power generation project and therefore relates to the IRP for Electricity 2010 – 2030, the National Department of Environment, Forestry and Fisheries (DEFF) has been determined as the Competent Authority (CA) in terms of GNR 779 of 01 July 2016. The Provincial Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD & LR) is a Commenting Authority on the project.

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 Application for Environmental Authorisation (EA).

The EIA process being conducted for Kotulo Tsatsi Energy PV1 is undertaken in accordance with Section 24(5) of the NEMA, which defines the procedure to be followed in applying for EA, and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an 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 contains all the listed activities identified in terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324) which may be triggered by the proposed development of Kotulo Tsatsi Energy PV1, and for which EA has been applied:

Table 6.1: Listed activities identified in terms of the Listing Notices (GNR 327, 325 and 324)

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	12(ii)(c)	The development of – (ii) Infrastructure or structures with a physical footprint of 100 square metres or more Where such development occurs- (a) within a watercourse or (c) within 32 metres of a watercourse. ***The development of the solar PV facility and associated infrastructure will require the establishment of infrastructure (including internal access roads) with a physical footprint exceeding 100m2 within or within 32m of drainage features, ephemeral washes or streams present within the project site, and within 32m of an ephemeral drainage line located directly outside and along the north-western boundary of the development envelope. The infrastructure will have a physical footprint of more than 100 square metres.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	14	The development and related operation of facilities and infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. ***Dangerous goods such as fuel will be required to be stored and handled on site. The combined capacity of storage containers will be more than 80 cubic metres but will not exceed 500 cubic metres during the construction and operation phases.***

Notice Number	Activity Number	Description of listed activity
GN R327, 08 December 2014 (as amended)	19	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse. ***Drainage features, ephemeral washes or streams are present within the project site. During the construction phase, approximately 10 cubic metres of rock will be removed from the water features for the development of the facility and associated infrastructure.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	24 (ii)	The development of a road – (ii) with a reserve wider than 13.5m, or where no reserve exists where the road is wider than 8m. ***The construction of the solar PV facility will require the construction of new access roads up to 8m in width to provide access to the facility.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	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 1ha. ***The total area of land to be developed for the solar PV facility is larger than 1 hectare. The site is currently used for grazing and is outside of an urban area. The total extent of the development envelope is ~847ha.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended)	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more. ***The project comprises a renewable energy generation facility, which will utilise photovoltaic (PV) technology and will have a generation capacity of up to 200MW. The development is located outside of an urban area.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended)	15	The clearance of an area of 20ha or more of indigenous vegetation[23]. ***The facility is located on agricultural land where the predominant land use is livestock grazing, and comprises indigenous vegetation. The project would therefore result in the clearance of an area of indigenous vegetation greater than 20ha in extent.***

The development envelope assessed during the EIA Phase for Kotulo Tsatsi Energy PV1avoids any CBAs, ESAs and NC-PAES focus areas (refer to **Appendix D**). Therefore, Listing Notice 3 (GN 325 of 2017) activities, as included in the Scoping Phase, are not triggered for the EIA Phase since CBAs are avoided.

[23] "Indigenous vegetation" as defined by the 2014 EIA Regulations (GNR 326) refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

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 of Human Settlements, Water and Sanitation or the relevant Catchment Management Agency (CMA)). Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Table 6.2 lists the possible Water Uses associated with the proposed project and identified in terms of the NWA which require licensing either in the form of a General Authorisation (GA), or in the form of a Water Use License (WUL). The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 6.2: List of 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 ***Infrastructure associated with Kotulo Tsatsi Energy PV1will be located within the GN 509 regulated area of a watercourse (100m zone surrounding the identified ephemeral drainage line). The development footprint considered for the establishment of the facility is associated with the presence of drainage features, ephemeral washes or streams. Activities pertaining to the project might encroach on the water features which may lead to an impediment and diversion of the flow of water in the features.***
NWA (No. 36 of 1998)	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***Infrastructure associated with Kotulo Tsatsi Energy PV1will be located within the GN 509 regulated area of a watercourse (100m zone surrounding the identified ephemeral drainage line). The development envelope considered for the establishment of the facility is associated with the presence of drainage features, ephemeral washes or streams. Activities pertaining to the project might encroach on the water features which may lead to an altering of the bed, banks, course or characteristics of the features.***

Due to the development envelope of Kotulo Tsatsi Energy PV1 being located within the regulated area of an ephemeral drainage line located along the north-western boundary, an application for a water use authorisation in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GN R267), or a GA registered in accordance with the GN R509 of 2016 is required. The water use authorisation process for Kotulo Tsatsi Energy PV1will only be completed once a positive EA has been received and the project selected as Preferred Bidder. This is line with the requirements of 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 such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the proposed development, 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 South African Heritage Resources Agency (SAHRA) Permit Regulations (GNR 668).

6.3 Overview of the Scoping Phase

The Scoping Phase aimed to:

- Identify, describe and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed facility (including design, construction, operation and decommissioning) within the site through a desk-top review of existing baseline data and desk-top specialist studies.
- Identify potentially sensitive environmental features and areas within the broader site in order to inform the design process of the facility.
- Define the scope of studies to be undertaken within the EIA process.
- Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

Within this context, the objectives of the Scoping Phase were to, through a consultative process:

- Identify the policies and legislation relevant to the project.
- Motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred location.

- Identify and confirm the preferred project and technology alternative.
- Identify and confirm the preferred site.
- Identify the key issues to be addressed in the EIA phase.
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the project will impose on the preferred site through the life of the project, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site.
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

The Scoping Study considered an estimated capacity 200MW for the Kotulo Tsatsi PV1. The broader project site was considered during the Scoping Study to identify and delineate any environmental fatal flaws, "no-go" or sensitive areas which should be avoided. The preparation and release of the Scoping Report for a 30-day public review period provided stakeholders and I&APs with an opportunity to verify that the issues they had raised during the Scoping process had been captured and adequately considered and provided a further opportunity for additional key issues to be raised for consideration. The Final Scoping Report and Plan of Study for EIA was submitted to DEFF on 01 December 2020, and acceptance was received on 06 January 2021, marking the start of the EIA Phase (refer to **Appendix B**). Additional information requested by the DEFF in the Acceptance of the Scoping Report, and the location of the requested information in this EIA Report is detailed in **Table 6.3.**

Table 6.3: DEFF requirements and reference to Section in the EIA Report

DEFF Requirement for EIA:	Response / Location in this EIA Report:
Listed Activities: Please ensure that all relevant listed activities applied for, are specific and that it can be linked to the development activity.	All relevant activities applied for in the application for Environmental Authorisation and included in the EIA Report are relevant to the Kotulo Tsatsi Energy PV1 facility and can be linked to the development activity or infrastructure in the project description.
If the activities applied for in the application form differ from those mentioned in the final SR, an amended application must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link http://www.environment.gov.za/documents/forms.	An amended application form has been compiled for Kotulo Tsatsi Energy PV1and has been submitted as part of this EIA report.
The EIAr must provide an assessment of the impacts and mitigations measures for each of the listed activities.	An assessment of impacts and recommended mitigation measures are included in Chapter 8 of this report
Public Participation: Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. This includes but is not limited to the Northern Cape Department of Environment and Conservation (DENC), the provincial Department of Agriculture, the provincial Department of Transport, the Hantam Local Municipality, the Namakwa District Municipality, the Department of Water and Sanitation (DWS), the South African Heritage Resources Agency (SAHRA), the Department of Rural Development and Land Reform (DRDLR), and the	Proof of notification of the availability of the EIAr for review and comments to the: • Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (previously known as the Northern Cape Department of Environment and Nature Conservation); • Provincial Department of Agriculture; • Provincial Department of Transport; • DWS • Namakwa District Municipality; • Hantam Local Municipality • SARAH;

DEFF Requirement for EIA:	Response / Location in this EIA Report:
Department of Environment, Forestry and Fisheries: Directorate Biodiversity.	• DRDLR; and • DEFF: Biodiversity Conservation Directorate are included in Appendix C4 of the EIAr as proof of opportunity to comment has been provided.
Please ensure that all issues raised and comments received during the circulation of the draft SR and draft EIAr from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final EIAr.	All comments received during the: •commencement of the environmental authorisation process; •30-day review and comment period of the Scoping Report; and •announcement of the acceptance of the Scoping Report and the approval of the Plan of Study for the Environmental Impact Assessment have been included within this C&RR, and have been responded to, as required. Copies of all written comments received from registered I&APs and Organs of State are included in Appendix C6 of the EIAr. All comments received during the 30-day review and comment period of the EIAr will be captured in the C&RR which have been included as a separate document (Appendix C8) to the final EIAr.
Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	Proof of correspondence with the various stakeholders on the project database are included in Appendix C5 and those with the various Organs of State in Appendix C4 of the EIAr and proof of attempts to obtain comments from the stakeholders on the project database will be included in Appendix C5 and the attempts to obtain comments from the various Organs of State in Appendix C4 of the final EIAr.
A Comments and Response trail report (C&R) must be submitted with the final EIAr. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in table format as indicated in Appendix 1 of this letter. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copies verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&APs' comments.	All written comments received during the scoping and impact phase of the EIA process are captured in this C&RR and those to be submitted during the 30-day review and comment period of the EIAr from I&APs and Organs of State will be captured in this C&RR which has been included as a separate report to the final EIAr as Appendix C8.
Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.	All comments received from I&APs and those from Organs of State have not been split or arranged into categories but captured according to date received. Each submission received has been responded to individually
The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations, 2014, as amended.	The Public Participation Process has been conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended (GNR 326), as well as in

DEFF Requirement for EIA:	Response / Location in this EIA Report:
	accordance with the approved Public Participation Plan (Appendix C9). Scoping Phase I&APs and Organs of State were notified of the commencement of the EIA process as follows: » The BID, accompanied by a cover letter was submitted via email to those I&APs identified and the relevant organs of state on 16 October 2020 (refer to Appendices C4 & C5 of the final Scoping Report.) An advertisement was placed in the Gemsbok newspaper on 23 October 2020 (tearsheet included in Appendix C2 of the final Scoping Report) Live read on RSG (Radio Sonder Grense 100-104 MHz FM) on Sunday, 1 November 2020 (refer to Appendix C2 of the final Scoping Report for proof) The Scoping Report was made available for a 30-day review and comment period from, Friday, 23 October 2020 until Monday, 23 November 2020 and the availability of the report was announced through the means below. Opportunity for consultation was also provided during the 30-day review and comment period. The details of the availability of the report was included in the advertisement placed in the Gemsbok newspaper on 23 October 2020 (tearsheet included in Appendix C2 of the final Scoping Report). A notification letter was sent to all registered I&APs and Organs of State on the project database (Appendix C1 of the final Scoping Report) informing them of the availability of the Scoping Report for review and comment and the details of where the report could be accessed for review. Live read on RSG (Radio Sonder Grense 100-104 MHz FM) was done on Sunday, 1 November 2020 (refer to Appendix C2 of the final Scoping Report for proof) Virtual Focus Group Meetings were held with various key stakeholder groups on 12 November 2020. Notes of the meetings were included in Appendix C7 of the final Scoping Report The Scoping Report was also made available for download from Savannah Environmental's website and could also be sent via other file transfer services i.e. We Transfer, Dropbox, etc. or on CD, on request. Site notices were placed at the proposed development site and proof of the placement of the site notices are included in Appendix C2 of the final Scoping Report.

DEFF Requirement for EIA:	Response / Location in this EIA Report:
	Impact Assessment Phase I&APs and Organs of State were notified of the acceptance of the Scoping Report and approval of the Plan of Study for the Environmental Impact Assessment on Monday, 15 February 2021 (refer to Appendices C4 & C5 of the EIAr.) The EIAr was made available for a 30-day review and comment period from, Friday, 12 March 2021 until Thursday, 15 April 2021 and the availability of the report was announced through the means below. Opportunity for consultation was also provided during the 30-day review and comment period. The details of the availability of the EIAr was included in the advertisement placed in the Gemsbok newspaper on 12 March 2021 (tearsheet included in Appendix C2 of the EIAr). A notification letter was sent to all registered I&APs and Organs of State on the project database (Appendix C1 of the EIAr) on 10 March 2021, informing them of the availability of the EIAr for review and comment and the details of where the report could be accessed for review. Proof of notification is included in Appendices C4 and C5 of the EIAr. Live read on RSG (Radio Sonder Grense 100-104 MHz FM) on Friday, 12 March 2021 (refer to Appendix C2 of the EIAr) Virtual Focus Group Meetings were scheduled to take place the week of 23 March 2021. Notes of the meetings are included in Appendix C7 of the final EIAr).
<u>Layout and Sensitivity Maps</u> The EIAr must provide coordinate points for proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	A detailed Layout Map indicating coordinates of proposed infrastructure is included in Appendix O Coordinate points of the development site is provided in Chapter 2 of this EIA Report.
A copy of final layout map must be submitted with the final EIAr and all available biodiversity information must be used in the finalisation of the layout map.	A detailed Layout Map of proposed infrastructure is included in **Appendix O**
Existing infrastructure must be used as far as possible and the final layout map must indicate the following: - All supporting onsite infrastructure.	
- The location of sensitive environmental features onsite e.g. CBA, heritage sites, wetlands, drainage lines etc. that will be affected.	
- Buffer areas.	
- All "no-go" areas.	

DEFF Requirement for EIA:	Response / Location in this EIA Report:
The final EIAr must include an environmental sensitivity map indicating environmental sensitive areas, buffer areas and features identified during the assessment process.	An Environmental Sensitivity Map indicating all environmentally sensitive features is included in **Appendix O**
A Map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	A combined Layout and Environmental Sensitivity Map indicating all environmentally sensitive features and proposed infrastructure is included in **Appendix O**
<u>Specialist Assessments</u> The EAP must ensure that the terms of reference for all identified specialist studies include the following: - Detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructure that they have assessed and are recommending for authorisations.	The methodologies and assessments undertaken by specialist are detailed in the relevant specialist studies (**Appendix D** to **Appendix J**)
- Detailed description of all limitations to the studies.	The limitations and assumptions of specialist are detailed in the relevant specialist studies (**Appendix D** to **Appendix J**)
- Please note that the Department considers a 'no-go' areas, as an area where no development of infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas.	No-go areas have been identified for major washes within the development footprint for Kotulo Tsatsi PV1. An optimised layout map avoiding these No-Go areas is included in **Appendix O**
- Should the specialist definition of 'no-go' area differ from the Department's definition; this must be clearly indicted. The specialist must also indicate the 'no-go' area's buffer if applicable.	The definition of 'no-go' used in the specialist reports as well as the EIAr does not differ from the Department's definition.
- All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA.	All specialist studies are final and provide detailed/practical mitigation measures for the preferred alternative and recommendations. No additional studies are recommended.
Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice.	Chapter 10 of this EIA Report contains a summary of recommendations and conclusions made by specialists. No contradicting recommendations have been made.
<u>General</u> Should a Water Use Licence be required, proof of application for a license needs to be submitted.	The water use authorisation process for Kotulo Tsatsi Energy PV1will only be completed once a positive EA has been received and the project selected as Preferred Bidder. This is line with the requirements of the Department of Human Settlements, Water and Sanitation.

6.4 Overview of the EIA Phase

As per the EIA Regulations (GNR 326) the objectives of the EIA Phase are to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context.
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted Scoping Report.
- Identify the location of the development footprint within the approved site as contemplated in the accepted Scoping Report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.
- Determine the:
    - Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - Degree to which these impacts:
        - Can be reversed
        - May cause irreplaceable loss of resources
        - Can be avoided, managed or mitigated
- Identify the most ideal development footprint for the activity within the development envelope of the approved site as contemplated in the accepted Scoping Report based on the lowest level of environmental sensitivity identified during the assessment.
- Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted Scoping Report through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts.
- Identify residual risks that need to be managed and monitored.

This EIA Report assesses potential positive and negative, direct, indirect, and cumulative impacts associated with all phases of the project life cycle including pre-construction, construction, operation and decommissioning. In this regard the EIA Report aims to provide the relevant authorities with sufficient information to make an informed decision regarding the proposed project.

The following subsections outline the activities within the EIA process that have been undertaken to date.

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

Consultation with relevant authorities has been undertaken during the Scoping Phase and has continued throughout the EIA process. To date, this consultation has included the following:

- Holding of a Pre-application Meeting with the DFFE on 08 September 2020 (via the Microsoft Teams Platform) during which the project details, progress and proposed Public Participation Plan was presented. The Public Participation Plan was approved following the pre-application meeting by Muhammad Essop via email on 16 October 2020.
- Submission of the application form for Environmental Authorisation to the DFFE via the use of the DFFE Novell Filr System.
- Submission of the Scoping Report for review and comment on 23 October 2020; and submission of the Final Scoping report on 30 November 2021.
- Receipt of the Acceptance of Scoping on 06 January 2021.

The following steps were undertaken as part of this EIA phase of the process:

- Make the EIA Report available for a 30-day public and authority review period.
- Notification and consultation with stakeholders, I&APs and Organs of State that may have jurisdiction over the project, including provincial and local government departments, and State-Owned Enterprises.
- Incorporating comments received during the 30-day public review period and prepared a Final EIA Report.
- Submission of the Final EIA Report to DFFE for decision making.
- Provide an opportunity for DFFE and DAEARD & LR representatives to visit and inspect the proposed site and project area.

The submissions, as listed above, were undertaken electronically, as required by the DFFE (in line with the directions for new Applications for Environmental Authorisations provided for in GNR650 of 05 June 2020).

A record of all authority correspondence undertaken prior to and within the EIA Phase is included in **Appendix C4** and **Appendix C5**.

6.4.1.2 Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations 41 to 44 of the EIA Regulations 2014 (GN R326) (as amended). The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GN R326) (as amended) and is being followed for this proposed project.

The Public Participation Process undertaken for Kotulo Tsatsi Energy PV1considers the restrictions and limitations imposed by Government through section 27 (2) of the Disaster Management Act (Act No. 57 of 2002) of 2002 and the Directions issued by the Minister of Forestry Fisheries, and the Environment (DFFE) in terms of consultations with I&APs. A Public Participation Plan was prepared and submitted to DFFE for approval. Approval of the Plan was provided by the DFFE Case Officer via email on 16 October 2020 (**Appendix B**).

The alternative means of undertaking consultation have been designed and implemented by Savannah Environmental to ensure that I&APs are afforded sufficient opportunity to access project information and raise comments on the project through an interactive web-based platform (i.e. online stakeholder engagement platform) readily available and accessible to any person registering their interest in the project, and ensures that the public participation process is undertaken in line with Regulations 41 to 44 of the EIA Regulations, 2014, as amended. The Public Participation Plan (**Appendix C9**) considers the limitations applied by the Disaster Management Act Regulations prohibiting the gathering of people, as well as limitations which certain I&APs may have in terms of access to computers and internet as well as access to public spaces currently not open for operation that inhibits access to hard copy documentation. The online stakeholder engagement platform implemented by Savannah Environmental for the project allowed the EAP to visually present details regarding the project as well as consultation documentation, including project maps and plans, presentations and posters. The platform also contained the Scoping Report available for review. The use of an online tool enables stakeholders and I&APs to explore the project-specific content in their own time, and still enables them to participate in a meaningful way in the consultation process. The online platform allows for instant feedback and comments to be submitted, in so doing saving time for the

stakeholder and also giving the assurance that their comments have been submitted for inclusion in the project reporting.

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 EIA 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 EIA process in the following ways:

During the Scoping Phase

- identify issues of concern and suggestions for enhanced benefits;
- verify that their issues have been recorded;
- assist in identifying reasonable alternatives; and
- contribute relevant local information and knowledge to the environmental assessment.

During the EIA Phase

- contribute relevant local information and knowledge to the environmental assessment;
- verify that their issues have been considered in the environmental investigations; 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 that contains all the relevant facts in respect of the application is made available to I&APs for review.
- The information presented during the public participation process is presented in such a manner, i.e. local language and technical issues, that it avoids the possible alienation of the public and prevents them from participating.
- Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project.
- Various ways are provided to I&APs to correspond and submit their comments i.e. fax, post, email, SMS, WhatsApp or by sending a Please-call-me notification.
- Adequate review periods are provided for I&APs to comment on the findings of the Scoping and EIA Reports.

i. Stakeholder identification and register of I&APs	•Register as an I&AP on the online platfrom via completion of a form and provison of contact information, by responding to an advert, or sending a 'please call me' which will be responded to •State interest in the project •Receive all project related information via email
ii. Advertisments and notifications	•Advertisements, site notices and/or radio live reads and notifications provide information and details on where to access project information •Notifications regarding the EIA proceses and availability of project reports for public review to be sent via email, post or SMS notifications
iii. Public Involvement and consultation	•Distribution of a BID providing details on the project and how I&APs can become involved in the process •Submission of comments or queries via the online platform to the PP team •Virtual presentations available via the online platform •Availability of project information via the online platform •An opportunity for I&APs and stakeholders to request virtual meetings with the project team. •Direct in-person consultation will only take place in limited numbers and where sanitary conditions can be maintained at all times.
iv. Comment on the Scoping and EIA Reports	•Availability of the project reports via the online platform for 30-day comment period •Submission of comments via the online platform, email or post to the PP team •Comments recorded and responded to, as part of the process
v. Identification and recording of comments	•Comments and Responses Report, including all comments received, and included within the final Report for decision-making

i. Advertisements and Notifications

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

(ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
(iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;
(iv) The municipality which has jurisdiction in the area;
(v) Any organ of state having jurisdiction in respect of any aspect of the activity; and
(vi) Any other party as required by the competent authority.

40.(2)(c) Placing an advertisement in –
(i) One local newspaper; or
(ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;

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 EIA process and the availability of the EIA Report for comment was announced to the Organs of State, potentially affected and neighbouring landowners (including occupiers) and general public to register as I&APs and to actively participate in the process. This was achieved through the following:

» A letter advising registered parties of the Acceptance of Scoping received from DFFE and the commencement of the EIA process distributed on 06 January 2021.
» Notification letter distributed to all registered parties advising them of the availability of the EIA Report for review and comment on 15 February 2021
» An advertisement announcing the availability of and inviting comment on the EIA Report in the Gemsbok Local newspaper on 12 March 2021. The tearsheet of the newspaper advert will be included in **Appendix C2** of the Final EIA Report.
» A radio announcements (live read) by RSG on 12 March 2021 at the commencement of the 30-day review and comment period (Appendix C3). RSG is a national radio station covering the study area.
» The EIA Report has been made available for review by I&APs for a 30-day review and comment period from 12 March 2021 to 15 April 2021. The EIA Report has been made available on the Savannah Environmental website and all registered I&APs have been notified of the availability on 10 March 2021 via email which included the link to access the report on the Savannah Environmental website. The evidence of distribution of the EIA Report will be included in the final Report, which will be submitted to DFFE. I&APs have been encouraged to view the EIA Report and submit written comment. The EIA Report has been circulated to Organs of State via electronic transfer (Dropbox, WeTransfer, etc), or CD and/or hardcopy as per individual request. The evidence of distribution of the EIA Report has been included in this EIA Report (refer to **Appendix C**).

ii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities are being provided to

I&APs in the EIA phase of the process to note their issues and comments. I&APs were consulted through the following means:

- Opportunity for review of the EIA report for a 30-day period from 12 March 2021 – 15 April 2021. Comments received during this review period have been captured in within a Comments and Responses Report, and has been included within the Final EIA Report.
- Focus group meetings: Virtual focus group meetings were held with key government departments, stakeholders and landowners during the scoping phase of the process. The purpose of these focus group meetings was to provide an overview of the findings of the EIA studies in order to facilitate comments on the EIA process and EIA Report, as well as to record any issues or concerns raised by stakeholders regarding the project. As per the approved public participation plan, these meetings were held via a virtual/online platform. The minutes of these meetings were included in the final EIA for review and acceptance by the DFFE. A list of meetings undertaken is included in Table 6.3.
- One-on-one consultation meetings for example with directly affected or surrounding landowners. As per the approved public participation plan, these meetings will be held via virtual platform.
- Telephonic consultation sessions.
- Written, faxed or e-mail correspondence.

All comments received during the 30-day review period have been included in **Appendix C6** and minutes of all meetings held during the review period have been included in **Appendix C7** within this Final EIA report.

Table 6.4: Public involvement for Kotulo Tsatsi Energy PV1 (during Scoping and EIA Phases)

Activity	Date
Distribution of the BID, process notification letters and stakeholder reply form announcing the EIA process and inviting I&APs to register on the project database. The BID and electronic reply form was also made available on the online stakeholder engagement platform.	16 October 2020
Placement of site notices.	24 October 2020
Advertising of the availability of the Scoping Report for a 30-day review and comment period in Gemsbok Newspaper, including details on how to access the Scoping Report via the online stakeholder engagement platform.	21 October 2020
Radio Live Read by RSG regarding the Scoping report comment period, and the details of how to get involved and how contact with Savannah Environmental can be made.	15 November 2020
Distribution of notification letters announcing the availability of the Scoping Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners) and key stakeholder groups.	23 October 2020
30-day review and comment period of the Scoping Report.	23 October 2020 – 23 November 2020
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions. » Direct in-person consultation will only take place in limited numbers and where sanitary conditions can be maintained at all times.	Virtual Focus Group Meetings were held with various key stakeholder groups on 12 November 2020. The meetings held included: » Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform and Northern Cape Department of Agriculture, Forestry and fisheries » Hantam Local Municipality and Namakwa District Municipality » Affected and Adjacent Landowners
Radio Live Read by RSG regarding the EIA Report comment period, and the details of how to get involved and how contact with Savannah Environmental can be made.	12 March 2021
Distribution of notification letters announcing the availability of the EIA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners) and key stakeholder groups.	11 March 2021
30-day review and comment period of the EIA Report.	12 March 2021 – 15 April 2021
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners	Virtual Focus Group Meetings were held with various key stakeholder groups. The meetings held included:

» Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions. » Direct in-person consultation will only take place in limited numbers and where sanitary conditions can be maintained at all times.	» Landowners Focus Group Meeting: 24 March 2021 » Local and District Municipality: 30 March 2021 » DEARD&LR and DWS: 31 March 2021
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA Phase

iii. Registered I&APs entitled to Comment on the EIA Report

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

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

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

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

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

(b) Disability; or

(c) Any other disadvantage;

Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database have been notified via notification letter of the release of the EIA Report for a 30-day review and comment period, invited to provide comment on the EIA Report, and informed of the manner in which, and timeframe within which such comment must be made. The report has been made available in soft copies to I&APs due to restrictions and limitations on public spaces during the national state of disaster related to COVID-19. No hard copies of the report have been made available for review and comment in accordance with the approved public participation plan.

The EIA Report was made available on the Savannah Environmental website (i.e. online stakeholder engagement platform) (https://www.savannahsa.com/public-documents/energy-generation/). The notification was distributed at the commencement of the 30-day review and comment period, on **10 March 2021.** Where I&APs were not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions were used to provide the I&APs with a platform to verbally raise their comments on the proposed development.

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

iv. Identification and Recording of Comments

Comments raised by I&APs to date have been collated into a Comments and Responses (C&R) Report which is included in **Appendix C9** of the EIA Report. The C&R Report includes detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised. The C&R Report consists of written comments received.

Meeting notes of all virtual meetings and discussions undertaken during the 30-day review and comment period have been included in **Appendix C8** of the EIA Report.

The C&R Report has been updated with all comments received during the 30-day review and comment period and will be included as **Appendix C9** in this EIA Report submitted to the DFFE for decision-making.

Comments rearding the Kotulo Tsatsi PV1 project raised during the 30-day review period for the EIA report are summarised below:

- **Department of Forestry, Fisheries, and the Environment (DFFE):** The DFFE provided inputs to the environmental authorisation process regarding listed activities, public participation, alternatives, layout and sensitivity maps, specialist assessments, cumulative assessment, and the EMPr.
- **Department of Forestry, Fisheries, and the Environment – Biodiversity:** Provided input maintaining of buffer areas, and rehabilitation, alien invasive and erosion management plans
- **South African Heritage Resources Agency (SAHRA):** Requested a letter confirming the results of the previous palaeontological assessment undertaken on the project site remain relevant to the PV1 project. A Confirmation letter from heritage specialist is attached in Appendix H.1 of the EIA.
- **Telkom SOC Ltd:** Requested a sketch/plan of the project.
- **South African Civil Aviation Authority:** Provided their procedure for a SACAA obstacle application, which is required prior to construction.
- **Cell C:** Stated that Cell C has no objection with the construction of the facility as Cell C does not have any infrastructure at the location of the project.
- **PHS Consulting on Behalf of Leopont Property:** Requested clarity to why application for PV3 and PV4 have been retracted (not specifically related to the Kotulo Tsatsi Energy PV1 project). Raised comments regarding the presence of vultures in the broader area, and the findings of the avifauna specialist study; and these comments have been responded to by the avifauna specialist in the C&RR (Appendix C9). Further comments related to conservation and eco-tourism areas in the project area, and raised queries relating to the grid connection infrastructure for the development, and water supply. It should be noted that a water supply agreement letter for the project from the local municipality is included in Appendix Q of the EIA.

6.6 Outcomes of the DFFE Web-Based Screening Tool

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 applications in terms of Regulation 19 and 21 of the 2014 EIA Regulations.

The requirement for the submission of a Screening Report (**Appendix P)** for the proposed development is applicable as it triggers Regulation 19 of the 2014 EIA Regulations (as amended). **Table 6.4** provides a summary of the specialist assessment requirements identified for the project site in terms of the screening tool and responses to each assessment requirement based on the nature and extent of the project.

Table 6.4: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of Kotulo Tsatsi Energy PV1facility and associated infrastructure

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Soils and Agricultural Compliance Statement	Medium Sensitivity	An Agricultural Potential and Soils Compliance Statement has been undertaken for the proposed project (Appendix G)
Landscape/Visual Impact Assessment	Not specified within screening tool	A Visual Impact Assessment has been undertaken for the proposed project (Appendix M)
Archaeological and Cultural Heritage Impact Assessment	High Sensitivity	A Heritage Impact Assessment including an Archaeological assessment has been undertaken for the proposed project (Appendix H)
Palaeontology Impact Assessment	High Sensitivity	A Heritage Impact Assessment including a Palaeontological assessment has been undertaken for the proposed project (Appendix H)
Terrestrial Biodiversity Impact Assessment	Very High Sensitivity	An Ecology Impact Assessment has been undertaken for the proposed project (Appendix D)
Aquatic Biodiversity Impact Assessment	Very High Sensitivity	A Freshwater Assessment has been undertaken for the proposed project (Appendix F)
Avifauna Impact Assessment	Not specified within screening tool	A Terrestrial Biodiversity Assessment has been undertaken for the proposed project that includes the assessment of avifauna (Appendix E)
Civil Aviation Assessment	Low Sensitivity	The project is located in not located close to any airports or aerodromes. Privately owned airstrips are however noted in the area.
Plant Species Assessment	Medium Sensitivity	An Ecology Assessment has been undertaken for the proposed project that includes the assessment of flora (Appendix D)
Animal Species Assessment	Medium Sensitivity	An Ecology Assessment and Avifauna Assessment has been undertaken for the proposed project that includes the assessment of animal species (Appendix D and Appendix F)

6.7 Assessment of Issues Identified through the EIA Process

Based on the outcomes of the Scoping Phase evaluation of the project, the following issues were identified as requiring detailed assessment. The specialist consultants involved in the assessment of these impacts are indicated in Table 6.4 below.

Table 6.4: Specialist Studies undertaken as part of the EIA Phase

Specialist Study	Specialist Company	Specialist Name	Appendix

Ecology Impact Assessment	3Foxes Biodiversity	Simon Todd	Appendix D
Avifauna Impact Assessment	Birds and Bats Unlimited	Rob Simmons	Appendix E
Freshwater Impact Assessment	Nkurenkuru Ecology and Biodiversity	Gerhard Botha	Appendix F
Soils and Agricultural Compliance Statement	The Biodiversity Company	Ivan Baker	Appendix G
Heritage Impact Assessment	CTS Heritage	Jenna Lavin	Appendix H
Visual Impact Assessment	LOGIS	Lourens du Plessis	Appendix I
Social Impact Assessment	Savannah Environmental and Neville Bews & Associates	Lisa Opperman Neville Bews	Appendix J

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the facility. Identified impacts are assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high)
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2
  - Medium-term (5–15 years) – assigned a score of 3
  - Long term (> 15 years) - assigned a score of 4
  - Permanent - assigned a score of 5
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes
  - 4 is low and will cause a slight impact on processes
  - 6 is moderate and will result in processes continuing but in a modified way
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen)
  - Assigned a score of 2 is improbable (some possibility, but low likelihood)
  - Assigned a score of 3 is probable (distinct possibility)
  - Assigned a score of 4 is highly probable (most likely)
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures)
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high
- The **status**, which is described as either positive, negative or neutral
- The degree to which the impact can be reversed
- The degree to which the impact may cause irreplaceable loss of resources
- The degree to which the impact can be mitigated

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

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

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

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

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

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

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

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

As the developer has the responsibility to avoid or minimise impacts and plan for their management (in terms of the requirements of NEMA and the 2014 EIA Regulations (GNR 326)), 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. An Environmental Management Programme (EMPr) that includes all the mitigation measures recommended by the specialists for the management of significant impacts is included as **Appendix K** to this EIA Report.

6.7 Assumptions and Limitations

The following assumptions and limitations are applicable to the studies undertaken in the EIA Phase for the Kotulo Tsatsi Energy PV1 facility:

- 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 development area for the solar PV facility identified by the developer represents a technically suitable site for the establishment of Kotulo Tsatsi Energy PV1 which is based on the design undertaken by technical consultants for the project.
- The development footprint (the area that will be affected during the operation phase) will include the footprint for the PV facility and associated infrastructure (i.e. internal access roads, IESS, and ancillary buildings).
- Conclusions of specialist studies undertaken and this overall Impact Assessment assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset.
- Previously authorised grid connection infrastructure, including the Eskom collector substation, switching station and grid connection power line to Aries Substation will provide the grid connection solution for the facility, and is not required to be reassessed through this process.
- Previously authorised associated infrastructure which may be constructed for Kotulo Tsatsi Energy PV1 including the grid connection infrastructure, man camp, water reservoirs and pipelines, and power block and thermal storage is not required to be reassessed through this process.
- This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

The specialist studies in **Appendices D – J** include specialist study-specific limitations.

6.8 Legislation and Guidelines that have informed the preparation of this EIA Report

The following legislation and guidelines have informed the scope and content of this EIA 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;
- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation; 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).

Several other Acts, standards or guidelines have also informed the project process and the scope of issues addressed and assessed in this EIA Report. A review of legislative requirements applicable to the proposed project is provided in **Table 6.5**.

Table 6.5: Relevant legislative permitting requirements applicable to Kotulo Tsatsi Energy PV1

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* ∗ *Prevent pollution and ecological degradation,* ∗ *Promote conservation, and* ∗ *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. Considering the capacity of the proposed Kotulo Tsatsi Energy PV1 project (i.e. contracted capacity of 200MW) and the triggering of Activity 1 of Listing Notice 2 (GNR 325) a full	DFFE – Competent Authority Northern Cape DAEARD&LR – Commenting Authority	The listed activities triggered by the proposed project have been identified and are being assessed as part of the EIA process currently underway for the project. The EIA process will culminate in the submission of a Final EIA Report to DFFE for approval.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Scoping and EIA process is required in support of the Application for EA.		
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DFFE Northern Cape DAEARD&LR	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DFFE Northern Cape DAEARD&LR Hantam Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the remote location of the development area 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 under	Regional Department of Water and Sanitation	Where the development activities impede or divert the flow of water in a watercourse, or alter the bed, banks, course or characteristics

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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)).		of a watercourse, Section 21(c) and 21(i) of the NWA (Act 36 of 1998) would be triggered and the project proponent would need to apply for a WUL or register a GA with the DWS. The Kotulo Tsatsi Energy PV1 development envelope is located within the regulated area of an ephemeral drainage line present within the development area to the north-west. As a result, a water use authorisation for the project will be required from DWS; however, the process will only be completed once a positive EA has been received and the project selected as Preferred Bidder by the DMRE. This is in line with the requirements from DWS. An agreement letter for water supply from the local municipality is included in Appendix Q of the EIA.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy (DMRE)	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result, a mining permit or EA in this regard is not required to be obtained.
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which 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 and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.	Northern Cape DAEARD&LR/ Namakwa District Municipality	In the event that the project results in the generation of excessive levels of dust, the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed. However, with mitigation measures implemented, the Kotulo Tsatsi Energy PV1 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 and furnish	South African Heritage Resources Agency (SAHRA) Ngwao Boswa Kapa Bokone (NBKB) – provincial heritage authority	A full Heritage Impact Assessment (HIA) (with field work) has been undertaken as part of the BA process (refer to Appendix H of this EIA Report). Sites of varying significance, including cultural landscapes, have been identified within the project site and specific mitigation measures have been recommended by the specialist with regards to each identified find. Should a heritage resource of significance be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone (NBKB) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). This will be determined as part of the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.		final walk-through survey once the final location of the development footprint and its associated infrastructure has been determined.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).	DFFE Northern Cape DAEARD&LR	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. An Ecological Impact Assessment has been undertaken as part of the EIA Phase (refer to **Appendix E**). No protected species which require a permit were identified within the development envelope however, a pre-construction search and for protected flora is recommended. .

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DFFE Northern Cape DAEAR&LR	An Ecological Impact Assessment has been undertaken as part of the EIA Phase to identify the presence of any alien and invasive species present on site. Some alien invasive species, such as *Prosopis*, have been noted in the project area. However, no alien species were identified to be present on within the Kotulo Tsatsi Energy PV1development envelope (refer to **Appendix D**).
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.	Department of Agriculture, Land Reform and Rural Development (DALRD)	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented. In terms of Regulation 15E (GN R1048) where Category 1, 2 or 3 plants occur, a land user is required to control such plants by means of one or more of the following methods: » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » 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.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			» Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4. » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	Department of Agriculture, Land Reform and Rural Development (DALRD)	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals. The Ecological Impact Assessment undertaken as part of the EIA Phase included a site visit which allowed for the identification of any protected trees which may require a license in terms of the NFA within the project site (refer to **Appendix D**). No protected tree species were identified within the development envelope.
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.	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.		operation of Kotulo Tsatsi Energy PV1, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic 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,	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the DoH.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » 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.	DFFE – Hazardous Waste Northern Cape DAEARD&LR – General Waste	No waste listed activities are triggered by Kotulo Tsatsi Energy PV1; therefore, no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	» Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented.		
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	South African National Roads Agency (SANRAL) – national roads Northern Cape Department of Transport, Safety and Liaison	An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally dimensioned loads and transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the facility components may not meet specified dimensional limitations (height and width), which will require a permit.
Astronomy Geographic Advantage Act (Act No. 21 of 2007)	The Astronomy Geographic Advantage (AGA) Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas and for matters connected thereto.	Department of Science and Technology.	The site proposed for the development of the Kotulo Tsatsi Energy PV1 is located within the Northern Cape Province but outside of those areas considered as nationally significant astronomy advantage areas. The Kotulo Tsatsi PV 1 development is situated approximately 48km from the SKA buffer zone of the Brandvlei spiral. (refer to Appendix K of the EIA Report)

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Chapter 2 of the Act allows for the declaration of astronomy advantage areas whilst Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following: * Restrictions on use of radio frequency spectrum in astronomy advantage areas * Declared activities in core or central astronomy advantage area * Identified activities in coordinated astronomy advantage area; and * Authorisation to undertake identified activities.		
Aviation Act (Act No 74 of 1962) 13th amendment of the Civil Aviation Regulations (CARS) 1997	Any structure exceeding 45m above ground level or structures where the top of the structure exceeds 150m above the mean ground level, the mean ground level considered to be the lowest point in a 3km radius around such structure. Structures lower than 45m, which are considered as a danger to aviation shall be marked as such when specified. Overhead wires, cables etc., crossing a river, valley or major roads shall be marked and in addition their supporting towers marked and lighted if an aeronautical study indicates it could constitute a hazard to aircraft. Section 14 of Obstacle limitations and marking outside aerodrome or heliport – CAR Part 139.01.33 relates specifically to appropriate marking of wind energy facilities.	South African Civil Aviation Authority (CAA)	This Act will find application during the operation phase of Kotulo Tsatsi Energy PV1. Appropriate marking of project infrastructure >45m above ground level is required to meet the specifications as detailed in the CAR Part 139.01.33. An obstacle approval would be obtained from the South African CAA.
Provincial Policies / Legislation			

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Act provides lists of protected species for the Province.	Northern Cape DAEARD&LR	A collection/destruction permit must be obtained from the Northern Cape DAEARD&LR for the removal of any protected plant or animal species found on site. The Ecological Impact Assessment undertaken as part of the EIA Phase (refer to **Appendix D**) identified protected species *Hoodia gordonii* and *Aloe claviflora* within the project site. A specialist walkthrough is recommended prior to construction to determine if these species are located within the development footprint.

6.8.1 Best Practice Guidelines Birds & Solar Energy (2017)

The Best Practice Guidelines Birds & Solar Energy (2017) proposed by the Birds and Renewable Energy Specialist Group (BARESG) (convened by BirdLife South Africa and the Endangered Wildlife Trust) contain guidelines for assessing and monitoring the impact of solar generation facilities on birds in Southern Africa. The guidelines recognise the impact that solar energy may have on birds, through for example the alteration of habitat, the displacement of populations from preferred habitat, and collision and burn mortality associated with elements of solar hardware and ancillary infrastructure; and the fact that the nature and implications of these effects are poorly understood.

The guidelines are aimed at Environmental Assessment Practitioners (EAPs), avifaunal specialists, developers and regulators and propose a tiered assessment process, including:

(i) Preliminary avifaunal assessment – an initial assessment of the likely avifauna in the area and possible impacts, preferably informed by a brief site visit and by collation of available data; also including the design of a site-specific survey and monitoring project should this be deemed necessary.
(ii) Data collection – further accumulation and consolidation of the relevant avian data, possibly including the execution of baseline data collection work (as specified by the preliminary assessment), intended to inform the avian impact study.
(iii) Impact assessment – a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring if this was deemed a requisite at preliminary assessment.
(iv) Monitoring – repetition of baseline data collection, plus the collection of mortality data. This helps to develop a complete before and after picture of impacts, and to determine if proposed mitigation measures are implemented and are effective, or require further refinement. Monitoring may only be necessary for projects with the potential for significant negative impacts on birds (i.e. large area affected and / or vulnerable species present).

In terms of the guidelines, the quantity and quality of baseline data required to inform the assessment process at each site should be set in terms of the size of the site and the predicted impacts of the solar technology in question, the anticipated sensitivity of the local avifauna (for example, the diversity and relative abundance of priority species present, proximity to important flyways, wetlands or other focal sites) and the amount of existing data available for the area.

Data collection could vary from a single, short field visit (Regime 1, for e.g. at a small or medium sized site with low avifaunal sensitivity), to a series of multi-day survey periods, including the collection of various forms of data describing avian abundance, distribution and movement and spread over 12 months (Regime 3, for e.g. at a large developments located in a sensitive habitat, or which otherwise may have significant impacts on avifauna). **Table 6.6** is taken from the best practise guidelines and provides a summary of the recommended assessment regimes in relation to proposed solar energy technology, project size, and likely risk).

Table 6.6: Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.

Type of technology*	**Size****	**Avifaunal Sensitivity*****		
		Low	Medium	High
All except CSP power tower	Small (< 30ha)	Regime 1	Regime 1	Regime 2
	Medium (30 – 150ha)	Regime 1	Regime 2	Regime 2
	Large (> 150ha)	Regime 2****	Regime 2	Regime 3
CSP power tower	All	Regime 3		

Regime 1: One site visit (peak season); minimum 1 – 5 days.
Regime 2: Pre- and post-construction; minimum 2 – 3 x 3 – 5 days over 6 months (including peak season); carcass searches.
Regime 3: Pre- and post-construction; minimum 4 – 5 x 4 – 8 days over 12 months, carcass searches.

* Different technologies may carry different intrinsic levels of risk, which should be taken into account in impact significance ratings

** For multi-phased projects, the aggregate footprint of all the phases should be used. At 3ha per MW, Small = < 10MW, Medium = 10 – 50MW, Large = > 50MW.

*** The avifaunal sensitivity is based on the number of priority species present, or potentially present, the regional, national or global importance of the affected area for these species (both individually and collectively), and the perceived susceptibility of these species (both individually and collectively) to the anticipated impacts of development. For example, an area would be considered to be of high avifaunal sensitivity if one or more of the following is found (or suspected to occur) within the broader impact zone:

1) Avifaunal habitat (e.g. a wetlands, nesting or roost sites) of regional or national significance.
2) A population of a priority species that is of regional or national significance.
3) A bird movement corridor that is of regional or national significance.
4) A protected area and / or Important Bird and Biodiversity Area.

An area would be considered to be of medium avifaunal sensitivity if it does not qualify as high avifaunal sensitivity, but one or more of the following is found (or suspected to occur) within the broader impact zone

1) Avifaunal habitat (e.g. a wetland, nesting or roost sites) of local significance.
2) A locally significant population of a priority species.
3) A locally significant bird movement corridor.

An area would be considered to be of low avifaunal sensitivity if it is does not meet any of the above criteria.

**** Regime 1 may be applied to some large sites, but only in instances where there is abundant existing data to support the assessment of low sensitivity.

The bird monitoring which was previously conducted for the Kotulo Tsatsi properties was undertaken in line with a Regime 2 classification. Two sets of monitoring (i.e. a dry and a wet monitoring season) was adhered to as part of the independent avifauna assessment. The Regime 2 is in line with the avifaunal sensitivity known for the area. The avifaunal sensitivity is based on the number of priority species present, or potentially present, the importance of the affected area for these species, and the perceived susceptibility of these species to the anticipated impacts of the planned development. In addition, the avifauna specialist has conducted an additional survey in the wet season to confirm the findings and also confirm if the condition of the local environment has been changed or altered, which could impact on the bird abundance and activity in the project area. The results from the monitoring have been used to inform both the development footprint and Avifauna Impact Assessment report, attached as **Appendix E** to this EIA Report.

6.8.2 The IFC Environmental Health and Safety (EHS) Guidelines

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

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

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines; however, no Industry Sector EHS Guidelines have been developed for PV solar power to date. The application of the General EHS Guidelines should be tailored to the hazards and risks associated with a project, and should take into consideration site-specific variables which may be applicable, such as host country context, assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

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

- Environment
- Occupational Health & Safety
- Community Health & Safety

6.8.3 IFC's Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (2015)

While no Industry Sector EHS Guidelines have been developed for PV Solar Power, the IFC has published a Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (IFC, 2015). Chapter 8 of the Project Developer's Guide pertains to Permits, Licensing and Environmental Considerations, and states that in order to deliver a project which will be acceptable to international lending institutions, environmental and social assessments should be carried out in accordance with the requirements of the key international standards and principles, namely the Equator Principles and IFC's Performance Standards (IFC PS).

Some of the key environmental considerations for solar PV power plants contained within the Project Developer's Guide include:

- Construction phase impacts (i.e. OHS, temporary air emissions from dust and vehicle emissions, noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites and worker accommodation).
- Water usage (i.e. the cumulative water use requirements).
- Land matters (i.e. land acquisition procedures and the avoidance or proper mitigation of involuntary land acquisition / resettlement).
- Landscape and visual impacts (i.e. the visibility of the solar panels within the wider landscape and associated impacts on landscape designations, character types and surrounding communities).
- Ecology and natural resources (i.e. habitat loss / fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species).
- Cultural heritage (i.e. impacts on the setting of designated sites or direct impacts on below-ground archaeological deposits as a result of ground disturbance during construction).
- Transport and access (i.e. impacts of transportation of materials and personnel).
- Drainage / flooding (i.e. flood risk associated with the site).
- Consultation and disclosure (i.e. consulting with key authorities, statutory bodies, affected communities and other relevant stakeholders as early as possible).
- Environmental and Social Management Plan (ESMP) (i.e. compile an ESMP to ensure that mitigation measures for relevant impacts are identified and incorporated into project construction procedures and contracts).

These issues, as well as others identified, have been addressed through this EIA report.

CHAPTER 7. DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the local environment. This information is provided in order to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, Kotulo Tsatsi Energy PV1 have been described. This information has been sourced from both existing information available for the area as well as collected field data by specialist consultants and aims to provide the context within which this BA process is being conducted.

7.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Environmental Impact Assessment Report

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

Requirement	Relevant Section
(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	The environmental attributes associated with the development of Kotulo Tsatsi Energy PV1 is included as a whole within this chapter. The environmental attributes that are assessed within this chapter includes the following: » The regional setting of the broader study area and the project site indicates the geographical aspects associated with Kotulo Tsatsi Energy PV1. This is included in **Section 7.2**. » The climatic conditions for the Kenhardt area have been included in **Section 7.3**. » The biophysical characteristics of the project site and the surrounding areas are included in **Section 7.4**. The characteristics considered are topography and terrain, geology, soils and agricultural potential and the ecological profile which includes the vegetation patterns, listed plant species, critical biodiversity areas and broad-scale processes, freshwater resources, terrestrial fauna and avifauna. » The heritage and cultural aspects (including archaeology and palaeontology) has been included in **Section 7.5**. » The social and socio-economic characteristics associated with the broader study area and the project site has been included in **Section 7.6**

A more detailed description of each aspect of the affected environment is included in the specialist reports included as **Appendices D** to **J**.

7.2. Regional Setting

The Kotulo Tsatsi Energy PV1 development area is located approximately 70km south west of Kenhardt and 60km north east of Brandvlei in the Northern Cape Province. The Province is situated in the north-western corner of South Africa and has a land area of 372,889 km^2, therefore occupying approximately 30% of South Africa's land area and making it the largest province in South Africa even though it has the smallest population.

The town of Kenhardt is located to the north-east of the study area and is the closest town. Other towns within the surrounding area of the study area include Brandvlei to the south, and Upington, located ~ 170km to the north-east. Kenhardt offers various activities and sights which includes the Giant Camelthorn Tree which is about 600 years old, an old library which is declared as a national monument, the Quiver Tree Forest and Hiking Trail which leads into a forest of about 5000 kokerbome, a San Trail which include San engravings and the Verneuk Pan. The development area for Kotulo Tsatsi Energy PV1 falls within Ward 3 of the Hantam Local Municipality, under the Namakwa District Municipality.

The closest main access road to the proposed site is the R27 which is a Regional Route that consists of two disjointed segments. The first segment, also known as the West Coast Highway, connects Cape Town with Velddrif along the West Coast. The second runs from Vredendal via Vanrhynsdorp, Calvinia, Brandvlei and Kenhardt to Keimoes on the N14 near Upington. The larger site can be accessed from public gravel roads off the R27 with the most direct access provided by Soafskolk Road. The Sishen/Saldanha freight railway line bypasses the site to the north west.

The development area is situated south of the Soafskolk Road and east of the Aries-Helios 400kV overhead servitude line, which connects to the Aries Substation located ~50km to the north-east. The site is characterised by a barren flat to uneven surface bisected by a number of shallow drainage basins. Land use in the general area is dominated by low intensity sheep farming and the affected farms are divided into livestock camps.

A regional map of the study area indicating the location of the development area relative to local towns and roads is provided in Figure 7.1.

The 10MW Aries PV Solar Energy Facility is the only operational solar PV facility within the vicinity of the study area. The solar PV facility is located ~39km north-east of the study area, adjacent to the Aries Substation. The Aries Transmission Substation is located approximately 40km north-east of the development area, and the existing Aries-Helios 400kV power line is west of the development area.

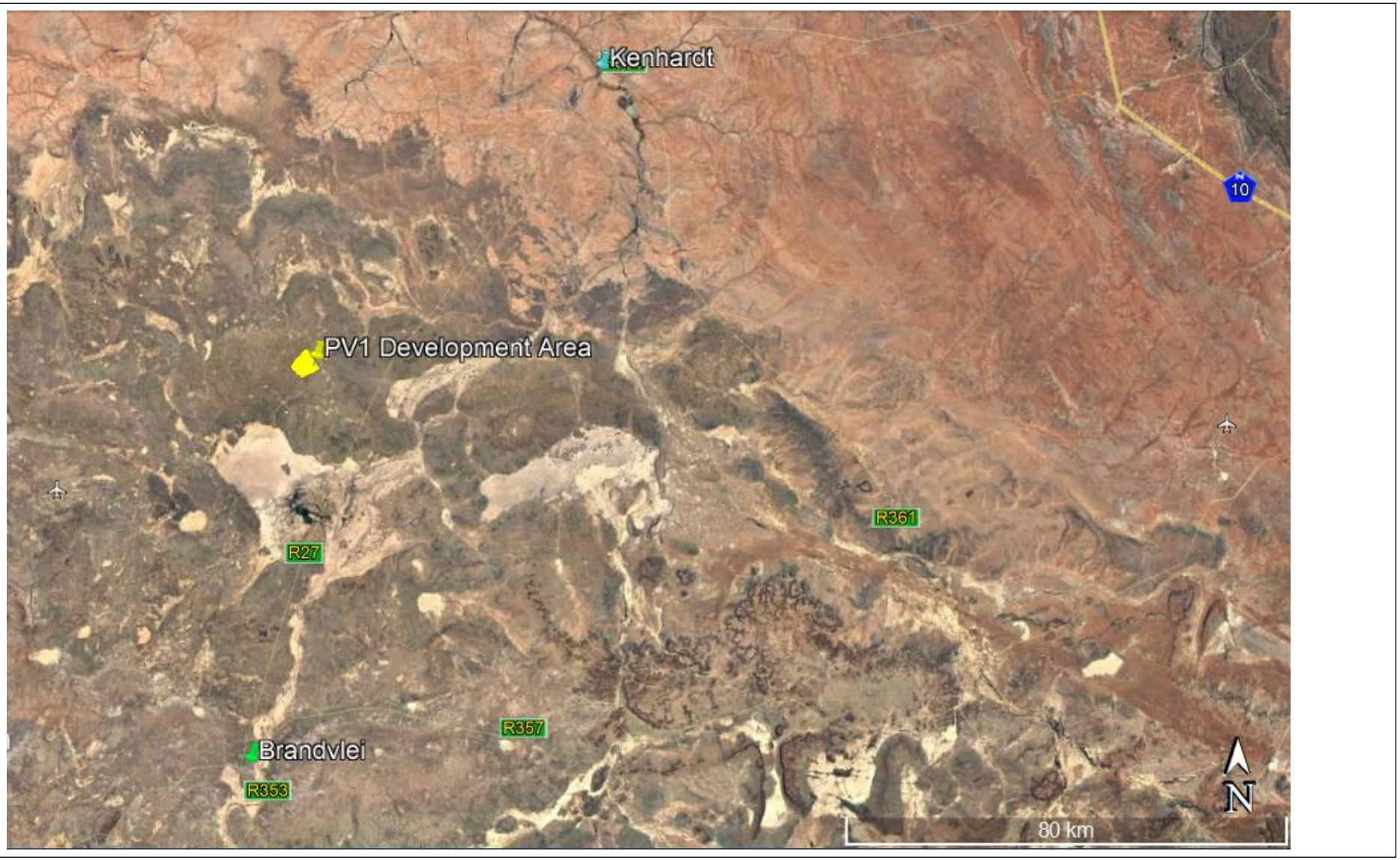

Figure 7.1: Regional map showing the location of the development area relative to local towns and roads

7.3. Climatic Conditions

The climate for the study site is expected to be most similar to that of Kenhardt, located approximately 70km north east of the study area. The area receives on average between 123 mm to 248 mm of rain per year. Moisture availability, which is the ratio of rainfall to evapotranspiration is one of the most important climate parameters for agriculture, and in this area is described as presenting a very severe limitation to agriculture. Rainfall amounts can vary significantly from year to year, and thunderstorms are typical during the early rainy season (Namakwa Bioregional Plan, 2008).

The average midday temperatures for Kenhardt range from 19.3°C in July to 35.5°C in January. The region is the coldest during July when the temperatures on average drop to 2.2°C during the night, but can go below 0˚C. The first occurrence of frost may be experienced as early as May and marks the end of the growing season (if not brought on earlier due to a lack of moisture availability).

7.4. Biophysical Characteristics of the Study Area and Development Area

7.4.1. Topographical profile

The majority of the project area is characterised by a slope percentage between 0-5%, with some smaller patches within the project area characterised by a slope percentage up to 18%. This indicates a uniform, flat topography in some areas with the remainder of the project area characterised by an undulating topography. The elevation of the project site is 903m to 945m above sea level. The area is characterised by a barren surface bisected by a number of shallow poorly developed drainage basins.

7.4.2. Geology, Soils and Agricultural Potential

The site is underlain by mudstone, sandstone and shale of the Prince Albert Formation and post Karoo dolerite intrusives. These occur over much of the site and are overlain by recent Kalahari deposits comprising wind-blown sand and dunes, and red brown sand. This area is known for having thick aeolian (wind-blown) deposits. Aeolian deposits are renowned for having a collapsible grain structure and being highly compressible, with a great reduction in shear strength when saturated.

Calcretes and duripans are common in the area. Calcrete might be found in seasonal watercourses, pans or areas where shallow water tables are present.

i. <u>Soils and agricultural capability</u>

Existing soil information was obtained from the Land Type database (Land Type Survey Staff, 1972 – 2002). A land type is an area with similar climate, topography and soil distribution patterns which can be demarcated on a scale of 1:250 000. One land type dominates the development area, namely Fc137.

F-land types are generally young landscapes where the dominant pedological processes have been weathering, clay illuviation and formation of orthic A horizons. Although the dominant soil forms are normally shallow Glenrosa and Mispah forms, any other soil forms can be accommodated in F-land types provided that they do not qualify the area for inclusion in other land types. The dominant soils in these land types are often shallow, thereby limiting the suitability for crop production.

In land type Fc137, shallow Mispah and Glenrosa soils as well as rock outcrops dominates and covers approximately 70% of the area. Slightly deeper Clovelly and Oakleaf soils cover the remaining 30%, and tend to be in the lower-lying areas. Although the land type database is invaluable to provide background to the study site, it was created on a 1:250 000 scale and does not necessary accurately reflect the actual soils on the site.

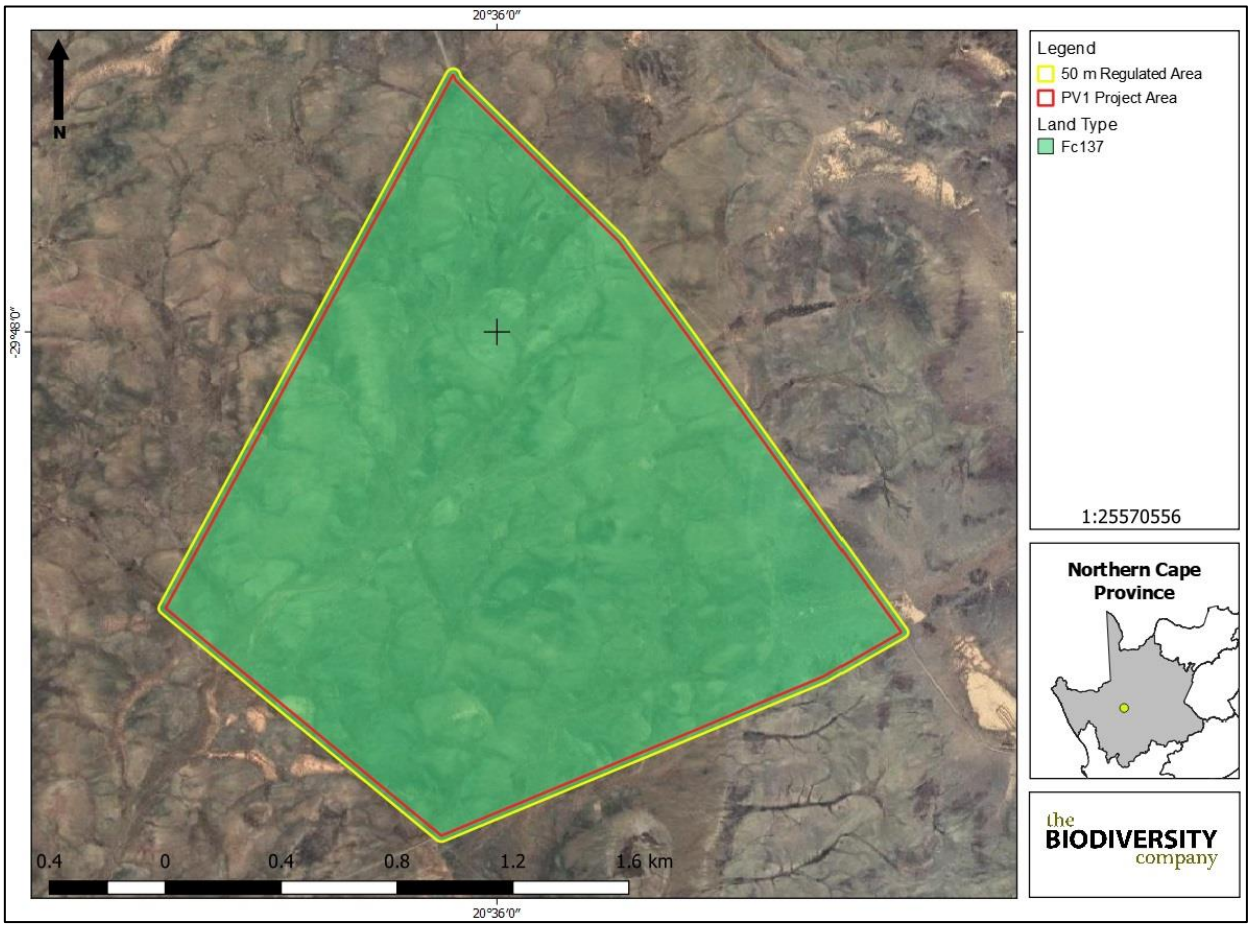

Figure 7.2: Land type present within development area

The land capability and land potential of the resources in the project area ranges from Very Low to Moderate.

ii. Land use and carrying capacity

The current land-use is restricted to low intensity grazing. The natural grazing capacity of the larger farm is between 41 and 60 ha per stock unit. For the project development area, this figure is approximately 45 ha per stock unit (or 7.5 ha per Small Stock Unit (SSU) i.e. about 107 sheep for the total development area of the project). The low rainfall, high potential evaporation, high maximum and low minimum temperatures, coupled with shallow soils covering most of the site, limits any alternative land-use activities. A number of non-perennial drainage lines are present, but the dominant source of water for agricultural purposes is groundwater.

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

i. Vegetation description and associated habitats

The project site lies entirely within the Bushmanland Basin Shrubland vegetation type (refer to **Figure 7.3**). As a result of the arid nature of the area, very little of this vegetation type has been affected by intensive agriculture and it is classified as Least Threatened. There are few endemic and biogeographically important species present within this vegetation unit and only *Tridentea dwequensis* is listed by Mucina and Rutherford as biogeographically important while *Cromidon minimum*, *Ornithogalum bicornutum* and *O.ovatum* subsp *oliverorum* are listed as being endemic to the vegetation type. The characteristic species as described in Mucina & Rutherford (2006) for this vegetation type are not repeated here as the actual vegetation as observed on the site is described in the next section.

Other vegetation types which occur in the wider area include Bushmanland Arid Grassland which occurs on sandy pediments north and east of the site, Lower Gariep Broken Veld on the rocky hills of the area and Bushmanland Vloere which occupies the low-lying flat pan systems of the area. Neither Bushmanland Arid Grassland or Lower Gariep Broken Veld occur in proximity to the site and would not be affected by the development. There is a small pan within the site that can be considered to represent the Bushmanland Vloere vegetation, but which has not been mapped under the VegMap or the 2018 NBA wetlands layer.

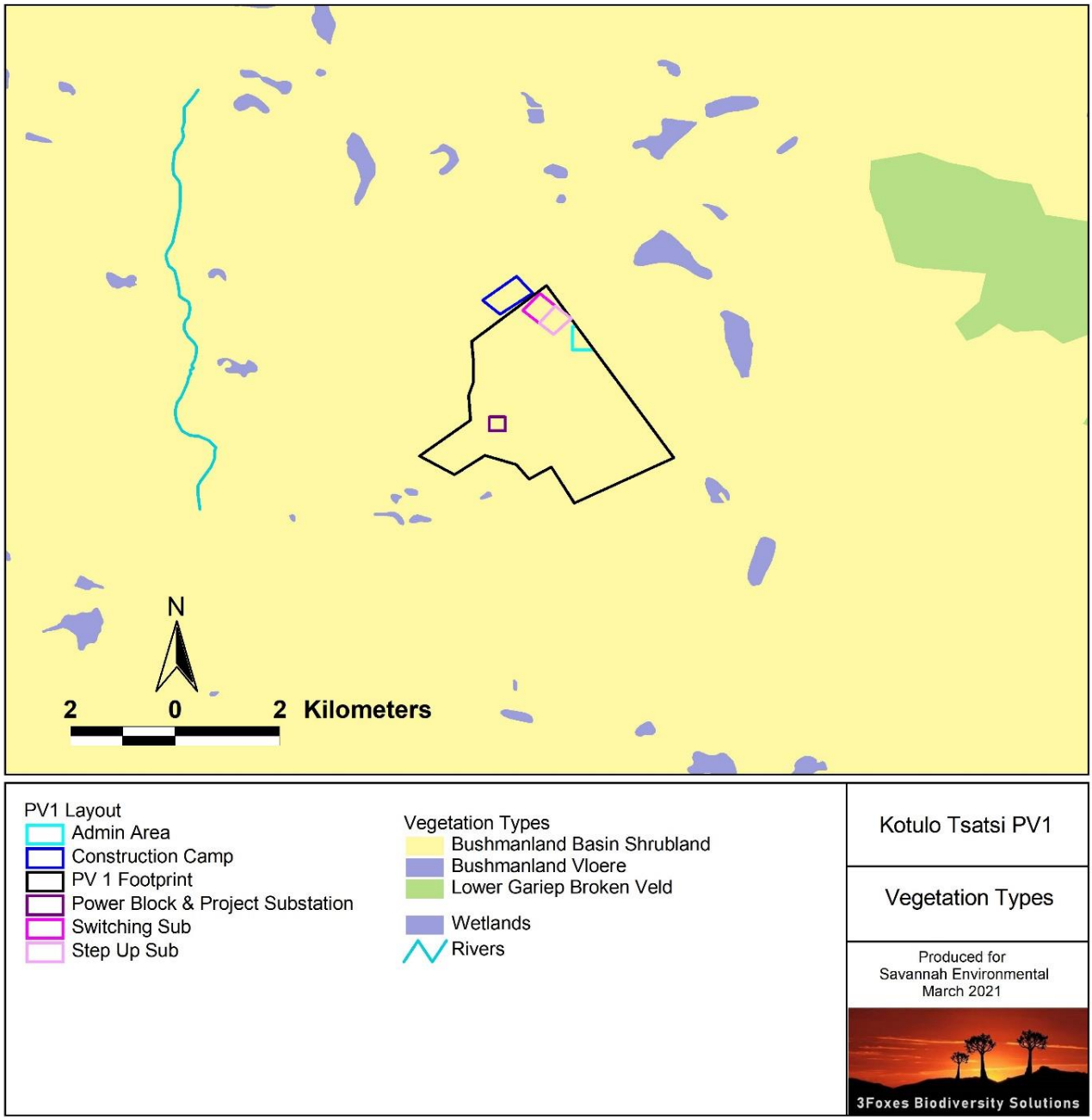

Figure 7.3. Broad-scale overview of the vegetation in and around the Kotulo Tsatsi Energy PV1 site.

The plant communities and habitats of the affected area as observed at the site are described and illustrated below.

» **Bushmanland Basin Shrubland**

At a broad level, the Bushmanland Basin Shrubland of the site is very homogenous and repetitive, with generally low diversity. There is, however, some variation at the site related largely to soil depth, with very sparse vegetation present on the areas of stony soils (**Figure 7.4**), usually associated with the slightly elevated hills of the site, while the lower-lying areas have deeper soils and are characterised by various shrub-dominated communities (**Figure 7.5**).

Figure 7.4: Stony soils with low vegetation cover

Figure 7.5: The lower-lying parts of the site on deeper soils

» **Washes and Drainage Features**

The low rainfall and flat topography of the site means that the drainage features (wash features) present are not well-developed. These areas are typically dominated by *Rhigozum trichotomum* with occasional taller species such as *Parkinsonia Africana* (**Figure 7.6**).

Figure 7.6: Wash feature within project site

ii. Fauna

Although not remarkably rich in species diversity or endemism, the fauna of the region is considered to be well adapted to its climatic extremes.

a) Amphibians

Eight amphibian species have the potential to occur in the study site, but given the aridity of the site, only those species which are relatively independent of water would be present. The Karoo Toad *Vandijkophrynus gariepensis* is the most likely species to be present on the site, but even this species is unlikely to be abundant and likely relies on anthropogenic water sources. The drainage wash areas are too small and temporal to represent breeding sites for amphibians.

b) Reptiles

Thirty reptile species have the potential to occur in the study area. Of these, several species were recorded during the site visits: *Psammophis* species (sand snake), Tent Tortoise, Variegated Skink and Southern Rock Agama. No specialised reptile habitats were observed within the development footprint and there were no areas of particular significance for reptiles present at the site.

c) Mammals

Fifty mammal species have the potential to occur in the study area however, the actual number of species to occur at the site is likely considerably less. Yellow Mongoose, South African Ground Squirrel *Xerus inauris*, Steenbok and Common Duiker were observed on the site and there was evidence of Aardvark, Aardwolf, Cape Porcupine, Bat-Eared Fox and Stiped Polecat. Widespread predators such as Caracal, Black-backed Jackal and Cape are also likely to be present at typically low density for an arid area.

iii. Alien invasive species

The SANBI database lists several alien invasive species in the wider Kenhardt area. Of these, only *Prosopis glandulosa* could be confirmed within the study area. *Prosopis glandulosa* is considered a Category 3 Listed Invasive species, indicating that it must be managed. However, where it occurs in riparian areas, it must be considered a Category 1b species, indicating that it must be eradicated and controlled.

Additional alien invasive species do occur in the surrounding area along major transport routes, which could be accidentally introduced to the project site during construction. Regular monitoring and early eradication should enable a cost-effective control of invasives.

iv. Species of Conservation Concern

The following species of flora and fauna were observed on the study site during this survey are protected:

The Northern Cape Nature Conservation Act (Act 9 of 2009)

Fauna: Aardvark (*Orycteropus afer)*
Aardwolf (*Proteles cristatus*)
Bat-eared Fox (*Otocyon megalotis*)
Note: all Girdled Lizards, Land Tortoises and Chameleons that may be on the site during construction are protected and must be relocated to safety within the same land portion

Flora: *Hoodia gordonii*
Aloe claviflora

National Environmental Management Act: Biodiversity Act (NEMA: BA) (Act No. 10 of 2004) and amendments

» Ghaap: *Hoodia gordonii*

v. Critical Biodiversity Areas and Conservation Targets

The majority of the development enevelope of Kotulo Tsatsi PV1 is located within Other Natural Areas (ONA) (**Figure 7.5**). Within the southern portion of the development area, outside of the development footprint, areas/features demarcated as Critical Biodiversity Area One (CBA1) and Critical Biodiversity Area Two (CBA2) are present. There is currently no infringement of the development footprint on any CBA areas.

The Namakwa Bioregional Plan Draft 1 was published in 2010 by the Namakwa District Municipality however, updated CBA data has been subsequently published by the Northern Cape DARD&LD (2018). This provides objectives for Critical Biodiversity Areas, Ecological Support Areas (ESA) and Other Natural Areas which guides the appropriate land-use management within these defined areas. The foundations of the CBA classification are the biodiversity sector's understanding and quantification of the desired ecological state or biodiversity land management objectives for a given component of biodiversity. The

table below provide the land management objectives associated with the CBA areas present within and surrounding the Kotulo Tsatsi PV1 development area.

CBA Category	Land Management Objective
CBA 1 and Protected Areas	Natural landscapes: » Ecosystems and species fully intact and undisturbed » These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost then targets will not be met.
CBA 2	Near-natural landscapes: » Ecosystems and species largely intact and undisturbed. » Areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets. » These are landscapes that are approaching but have not passed their limits of acceptable change.
ESA	Functional landscapes: » Ecosystems moderately to significantly disturbed but still able to maintain basic functionality. » Individual species or other biodiversity indicators may be severely disturbed or reduced. » These are areas with low irreplaceability with respect to biodiversity pattern targets only.
ONA	Production landscapes: » Manage land to optimise sustainable utilization of natural land.

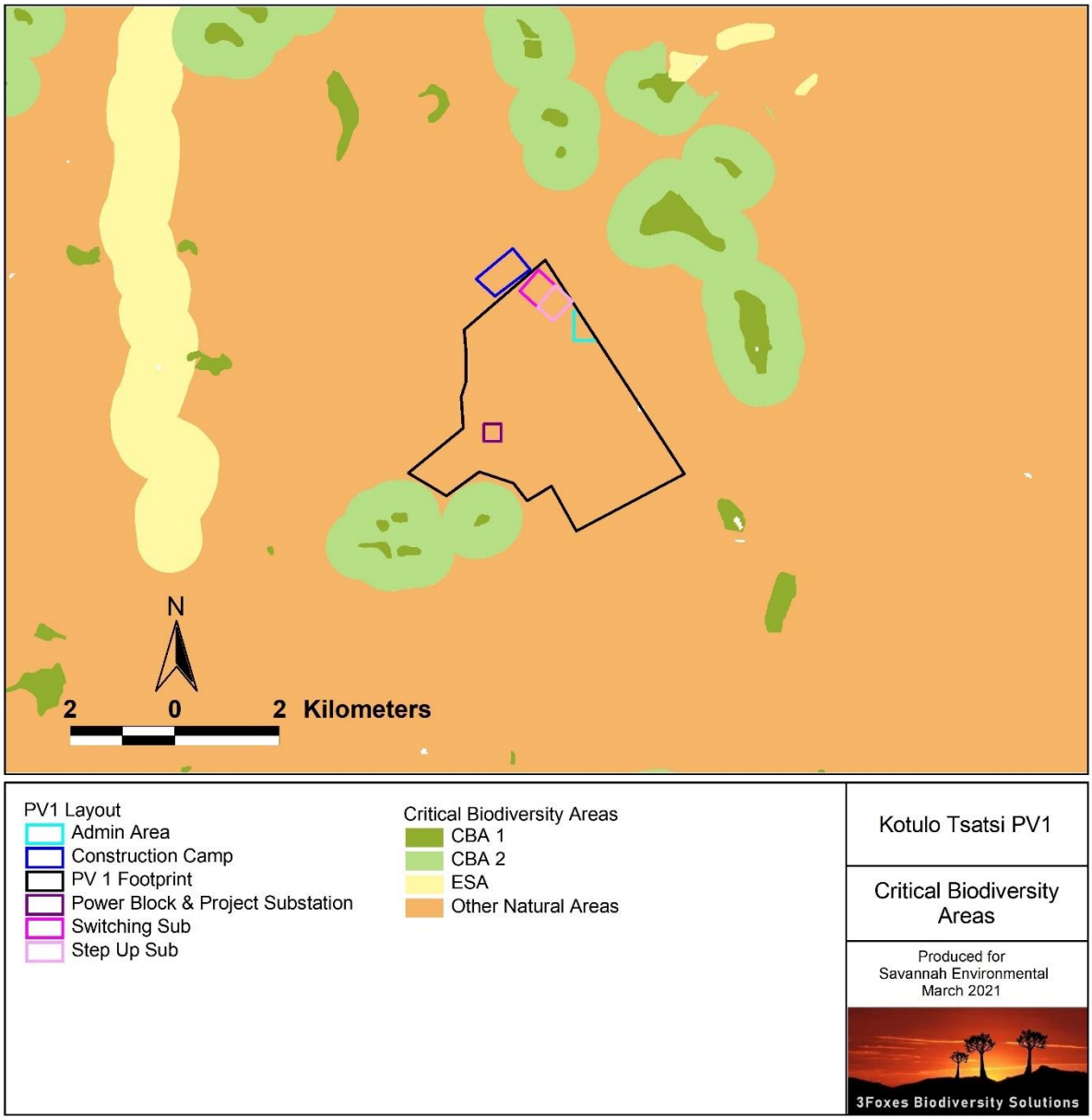

Figure 7.5: Northern Cape Critical Biodiversity Areas map for the study area, showing that the site falls but does not fall within any CBAs.

vi. Conservation/Protected Areas

Based on latest available data (SAPAD, 2020), no recognised conservation or protected areas are located in close proximity to the proposed development area. The Meerkat National Park is located approximately 109km south east of the proposed development. No recognised Important Bird Areas (IBA) are located in close proximity to the project, with the closest IBA being 105km north-west of the project development area.

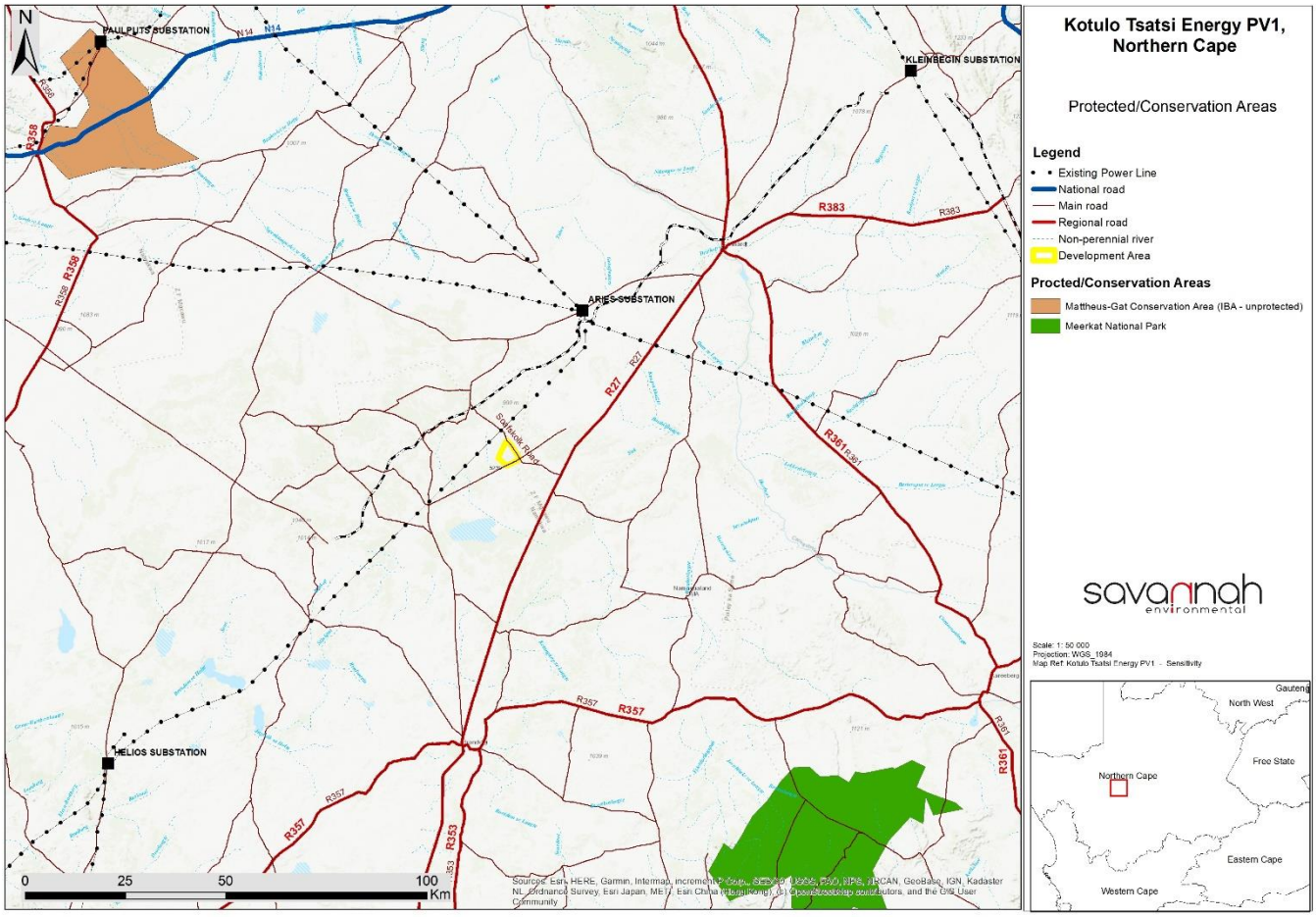

Figure 7.6: Map showing recognised conservation/protected and Important Bird Areas in relation to the project development area.

vii. Avifauna

» ***Supporting avifaunal habitat within the study area***

Bird habitats in the study area can be grouped into three broad categories:

- » Open grassy/rocky areas (Bushmanland basin shrubland) that supports grassland dominated by larks, korhaans and also larger dark rocky outcrops that support raptors and wheatears on the kopjes;
- » Low shrubland bush which covers much of the lower lying areas, and is especially dense in the dry ephemeral drainage lines;
- » Pans (Bushmanland Vloere) which are found dotted across the larger study area either as small pans or very large accumulation areas for ephemeral water. When dry, these areas may hold flocks of seed-eating birds and when inundated may hold wetland species (e.g. flamingos) that are attracted from afar with the rains;
- » Artificial habitats are provided by (i) the existing power lines and accompanying towers, and (ii) the water points that are scattered across the landscape for livestock. The power line towers are used mainly by large raptorial birds from which to hunt and occasionally nest on (goshawks, kestrels and eagles), while large numbers of birds are attracted to farmer's dams.

Each of the main habitat types have been surveyed independently for bird species richness and bird abundance in the dry and wet seasons.

» ***Avian species richness and red data species***

The expanded site supports a low avian richness of only 71 species, with almost two thirds of these (62%) are endemic species. They include five threatened (red-listed) species (**Table 7.1**), and those of most concern are the large nomadic Red Data bustards - Ludwig's *Neotis ludwigii* and Kori Bustard *Ardeotis kori*. Also, *Endangered* Martial Eagles *Polemaetus bellicosus* twice bred (successfully) in 2014 and 2016 on a 400kV tower on the Aries-Helios 1 400kV power line traversing the study area. No breeding was evident in 2015 or 2020.

Table 7.1: Red Data bird species and their likelihood of occurrence in the Kotulo Tsatsi expanded site drawn from (4) site visits June 2016 (12 days), March 2015 (5 days), September 2014 (7 days), December 2020 (2 days)

Common name	Scientific name	Red-list category	Reporting Rate*	Habitat
Kori Bustard	*Ardeotis kori*	Near Threatened	1/26 = 4%	Open grassland and treed savanna
Ludwig's Bustard	*Neotis ludwigi*	Endangered	4/26 = 15%	Open grassland
Martial Eagle	*Polemaetus bellicosus*	Endangered	8/26 = 31%	All habitats including pylon lines
Lanner Falcon	*Falco biarmicus*	Vulnerable	2/26 = 8%	All habitats including pylon lines
Sclater's Lark	*Spizocorys sclateri*	Near Threatened	5/26 = 19%	Open rocky/grassland

* based on number of times observed in the 12 days of surveys in June 2016, 7-day + 5-day + 2-day surveys in September 2014, March 2015, June 2016, Dec 2020 = 26 days.

In February 2021 three species of vultures (Critically Endangered White-backed Vultures, Endangered Lappet-faced Vultures, and Endangered Cape Vulture) were noted within the project area by the specialist, and were noted as being transient birds from Namibia (F van der Merwe, M Boorman pers. comm.). Prior to early 2021, there was nothing published on the presence of vultures in the area.

» ***Species recorded through on-site surveys***

From the 1km transects undertaken, a mean 4.0 species/km were recorded in June 2016. The total number of species recorded in all walking and driving surveys was 71, with 24% more species in the wet seasons than the dry season.

In 2020, following seven years of almost continuous drought two transects yielded only 5.5 species/km and even fewer numbers of birds (10.5 birds/km). This compares with 9.9 birds/km in the June 2016 visit and 43.7 birds/km in September 2014. That represents a four-fold decline in the drought years. Only three birds were recorded in 2016, ~1.5 km south west of the Kotulo Tsatsi Energy PV 1 site, and none in 2020, suggesting that that the bird species in the area are rare and nomadic.

In summary, very low numbers of birds were apparent during the drought years of 2016 and 2020 on site. This means that the proposed PV sites hold a very low species richness and abundance, and no Red Data species.

viii. Freshwater Features

The site can be described as moderately undulating (slopes 3-5%) to flat with few isolated outcrops, draining south-east into ephemeral water washes that drain into the Verneuk Pan System located 18 km to 45 km southeast and east of the study area.

Valley floors may or may not connect to larger drainage systems, but seldom accumulate enough runoff to create a flooding event. Still, all runoff collected in these depressions is filtered through the fine-grained but freely drained soils to replenish groundwater resources. Although the valley floors are often without vegetation due to their sometimes sodic/saline soils, they are very important in maintaining the overall water balance of the ecosystem. Because their function is to accumulate and store water, they are classified as wetlands.

Numerous non-perennial streams define a poorly developed dendritic drainage pattern; these rivers are seasonal and flow only after periods of heavy rainfall. There are a number of dry pans that occur throughout the study area. An ephemeral stream is approximately 2 800 m west of the development area (refer to **Figure 7.6**). This feature drains southerly towards the Gemsbokrivier. The Gemsbokrivier discharges into the Sak River approximately 30km downstream of the study area. The riverbed is dry and consists mainly of small rocks. The river banks are covered with light vegetation and a few trees. The significance of this stream is rated low as stream flow on the riverbed is not readily evident. This stream is located at the upper reaches (most upstream point) of Quaternary Catchment D57D. Upper reaches of the catchment are associated with low flows as the effective catchment area is small. Unlike perennial streams, this stream does not have dry weather flow as runoff is only observed during significant storm events and becomes dry for months. From a biological point of view, this stream cannot support flow-dependant aquatic life. From the National Biodiversity Assessment wetland map (refer to **Figure 7.6**), a depression wetland feature is located within the development area.

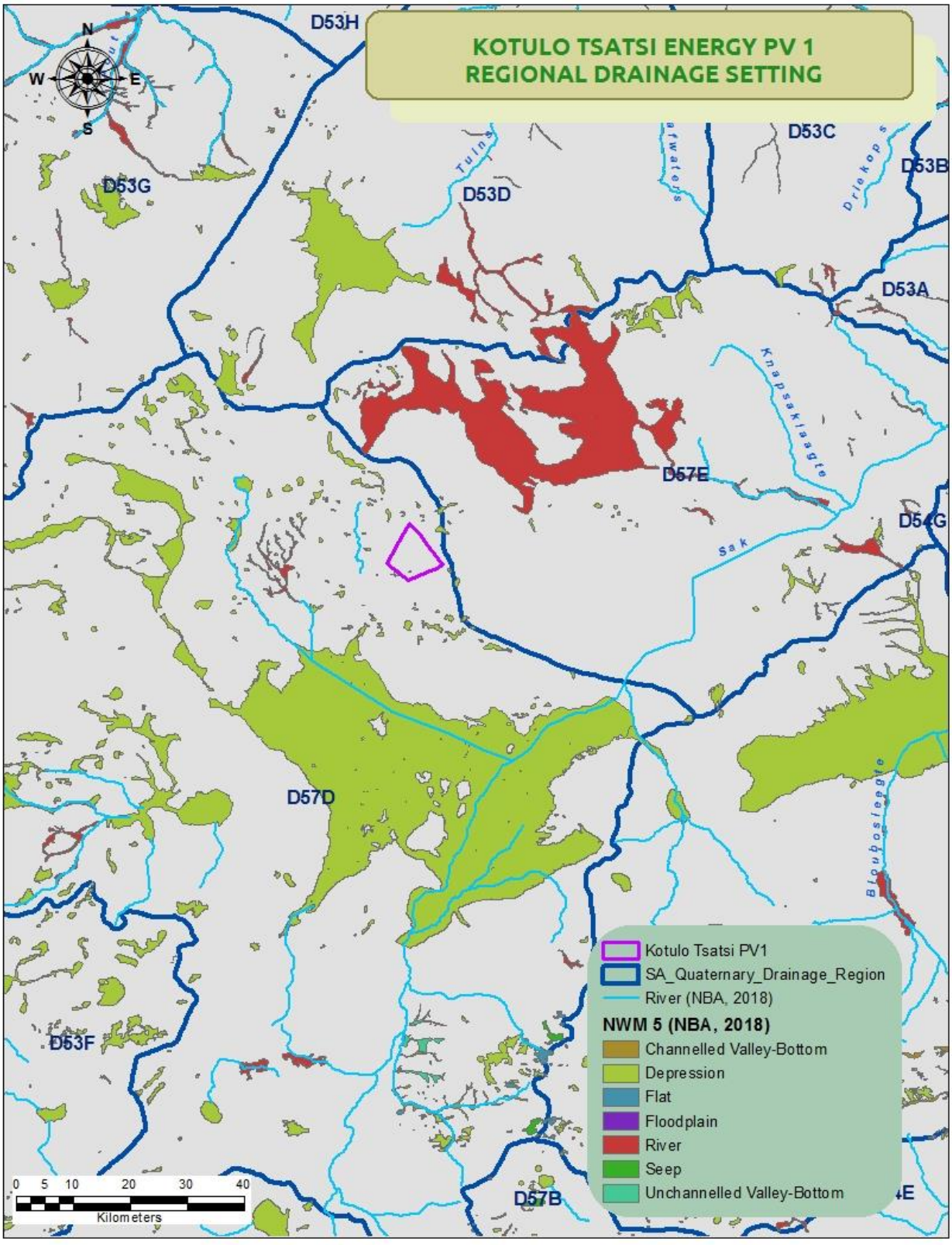

Figure 7.6: Drainage and freshwater features within the development area

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

7.5.1. Historical and Archaeological Background

The archaeology of the Northern Cape is rich and varied covering long spans of human history. Thousands of square kilometres of Bushmanland are covered by a low-density lithic scatter. Cultural Resources Management (CRM) surveys in the immediate vicinity provide some insight as to the occupation of the area and in the wider region provides a good basis for understanding the local archaeology. Collection of surface samples by other archaeologists means that stone artefacts north of the study area have been analysed and indicates the presence of humans in the area for the last two million years. The larger area also probably represented a rich source of rocks for knapping. Previous work therefore suggests that the wider area could contain a widespread distribution of Early and Middle Stone Age material with perhaps a few Later Stone Age sites, depending on topography and proximity to water.

The development area is characterised primarily by areas barren of vegetation situated on sedimentary surfaces consisting of mud rock and possibly shale. Within the area, no locally available raw material exists which is suitable for knapping. No Stone Age sites (knapping, quarry or habitation sites) were, therefore, recorded during a field survey. Artefact density in the broader study area is so low that they do not represent individual sites but rather background scatter or find spots.

7.5.2. Palaeontology

The broader study area is underlain by glacially-related sediments of the Permo-Carboniferous Dwyka Group (Karoo Supergroup, C-Pd). However, only the northern-most sector of the site is underlain by Dwyka rocks. The majority of the development area on Styns Vlei 280 is underlain by postglacial basinal mudrocks of the Prince Albert Formation (Karoo Supergroup, Ecca Group, Pp) of Early Permian age. The Karoo Supergroup sediments have been locally intruded and baked by extensive intrusive sheets or sills of the Karoo Dolerite Suite (Jd) which build a north-south trending zone of rocky terrain running along the eastern border of Styns Vlei 280 as well as scattered outcrops further to the northeast and east (e.g. Klipheuwels). Small exposures of much older Precambrian basement rocks of the Namaqua-Natal Province are mapped to the east of the present broader study area on the farm Karee Boom Kolk 248, and similar outcrops may also occur subsurface in the broader study area itself. These comprise two billion year old granitoid intrusions.

A field study showed that the Karoo Supergroup sediments, Karoo dolerites and any older basement rocks within the broader study area, including the development area, are almost entirely mantled with a range of Late Caenozoic superficial deposits, mostly of Late Tertiary to Quaternary age. They include alluvium, pan sediments, calcrete hard pans as well as surface and subsurface gravels and may reach thicknesses of several meters or more. Where exposed in borrow pits along the major roads and the Sishen-Saldanha railway line and in other artificial excavations (e.g. farm dams), the bedrocks are often weathered and calcretised to a depth of several meters, reflecting periods of both drier and wetter climates in the geologically recent past. The projecting small koppies within the area consist largely of dolerite and occasionally of associated baked (thermally metamorphosed) country rocks.

The area proposed for development is underlain by sediments of moderate and high sensitivity for impacts to palaeontological heritage. However, desktop analysis of the fossil records of the various sedimentary rock units underlying the broader study area, combined with field assessment of numerous representative

rock exposures within and close to this area, indicate that all of the geological units are of low to very low palaeontological sensitivity. The potentially fossiliferous Karoo Supergroup bedrocks (Dwyka and Ecca Groups) are deeply weathered and extensively calcretised near-surface. Over the majority of their outcrop areas the bedrocks are mantled by various superficial deposits that may reach thicknesses of several meters and that are of low palaeontological sensitivity. These include alluvium, colluvium, a wide range of surface gravels, calcrete hardpans and pan sediments. The only fossil remains recorded during the field assessment are:
(1) small-scale fossil burrows within Prince Albert Formation mudrocks of Early Permian age,
(2) downwasted, ice-transported blocks (erratics) of Precambrian stromatolitic carbonate within surface gravels overlying the Dwyka Group tillites, and
(3) rare calcretised termitaria of probable Pleistocene or younger age embedded within weathered Dwyka bedrocks.

These fossils are all of widespread occurrence within Bushmanland and special protection or mitigation measures for the very few known fossil sites are, therefore, not required.

7.6 Social Context

The majority of the study area is sparsely populated (30 people per km^2 within the Namakwa District Municipality) and consists of a landscape of wide-open expanses and vast desolation. The scarcity of water and other natural resources has influenced settlement within this region, keeping numbers low, and distribution limited to the availability of permanent water. Settlements, where they occur, are usually rural homesteads and farmsteads. Land use within the study area is limited to grazing (sheep), and land cover consists mostly of shrubland.

A main road (i.e. the R27) services the study area. Other roads are secondary roads linking with one another and with the R27, giving access to the farmsteads and settlements.

There are no built-up areas, towns or mining land uses in close proximity to the study area. Infrastructure includes the Aries-Helios 1 400kV overhead power line, the Aries Substation and the Sishen/Saldanha railway line (a freight railway line). Both the power line and the railway line traverse the study area from the south west to the north east.

7.6.1 Demographic Profile

The Hantam Local Municipality (LM) covers a geographical area of 36 128km^2 which is approximately 28% of Namakwa District Municipality (DM) total area. The Hantam LM has a population of 21 578 people at a population growth rate of 0.59 and a population density of 1/km^2. 18% of Namakwa DM population resides within the HLM.

Kenhardt is the closest town to the proposed site and is situated within the Kai !Garib Local Municipality and is located approximately 70km north east from the proposed site. Kenhardt is a town that covers an area of 159.35km^2 and consists of a population of 4 843 people, with a density of 30 people per squared kilometre (Census, 2011).

According to Census 2011, Hantam LM has a total population of 21 578, of which 82.2% are coloured. Afrikaans is the most prominent spoken language in both the Hantam LM and Kai !Garib LM.

7.6.2 Economic Profile of the Hantam Local Municipality

The closest town to the site which is located in the Hantam Local Municipality is Brandvlei. It is situated on the north-western boundary of the municipality and has a population of 2 859 people (Stats SA, 2014). It includes some minor retail shops and a filling station and has little to offer for local residents and visitors. It has limited social infrastructure and primarily services the nearby rural communities and farmers.

The economy is relatively small and in 2013 was valued at R1 307 million in current prices (Quantec, 2014). It contributed 11.0% to the Namakwa District's Gross Domestic Product per Region (GDP-R) or 1.9% to the provincial economy. In the period between 2008 and 2013, the economy of the Hantam LM grew at a Compounded Annual Growth Rate (CAGR) of 2.4%, showing a better performance than that of Namakwa (0.9%) and the Northern Cape (1.3%) (Quantec, 2014). Overall, the District is considered to be in distress and the Hantam LM economy, according to the Hantam SDF (Umsebe Development Planners, 2010), also requires investment injection and government support to turnaround its situation.

In 2011, the Hantam LM had 13 860 people within the working age population, of who 7004 comprised the labour force (Stats SA, 2014). About 3.4% of the working age population was discouraged job seekers, who are capable of working but who are no longer looking for employment (Stats SA, 2014). The labour force comprised of 6 122 employed and 882 unemployed, reflecting a 12.6% unemployment rate which is significantly lower than that of the country's unemployment rate of 29.7% recorded by Stats SA through Census 2011 (Stats SA, 2014). The unemployment rate within the Hantam LM though varied significantly. For example, Brandvlei had the highest unemployment rate of 25.8% in the municipality (Stats SA, 2014).

About 60% of the employed population in the Hantam LM is employed in the formal sector, while one out of five people work in the informal sector (Stats SA, 2014).

The agricultural sector and personal services sectors in the Hantam LM account for the largest number of jobs created in the area, i.e. 19.7% and 20.6%. Other sectors that make a prominent contribution towards employment in both formal and informal sectors include trade (11.7%), business services (14.7%) and government services (19.1%). Since 2000, the number of jobs in the municipality has declined by 457 positions. Agriculture has lost the largest number of 1 700 jobs during that period following by trade (175 jobs) and construction (86 jobs). Other sectors have increased employment absorption since 2000, however it is clear that it was insufficient to offset the massive losses experienced in the agricultural sector.

7.6.3 Settlement and infrastructure

The project development area is located on Portion 3 of the Farm Styns Vley 280. The nearest homestead is Valsvlei which is unoccupied. The next nearest homestead is a farmhouse at Gannakom which is located approximately 5km from the development area and occupied by the manager of the farm.

There are no built up areas, towns or mining land uses within the immediate study area. Infrastructure includes the Aries-Helios 400kV overhead power line (directly to the west), and the Sishen/Saldanha railway line (a freight railway line) to the north west of the site. The R27 road is to the east of the development area. A gravel access road (Soafskolk road) forms the northern boundary of the development area and provides local access.

Table 7.2 provides a baseline summary of the socio-economic profile of the Hantam LM within which Kotulo Tsatsi PV1 is proposed. 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 Integrated Development Plans of the Namakwa DM and Hantam LM[24].

Table 7.2: Baseline description of the socio-economic characteristics of the area proposed for Kotulo Tsatsi PV1

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 Hantam LM and the Namakwa DM. » The Hantam LM covers an area of land 36 128km² in extent.
Population characteristics
» The Hantam LM has a total population of 21 505 with a growth rate of 0.2% between 2011 and 2017. » In terms of the age structure 6 192 of the population is between the ages of 0 and 14 years, 13 274 of the population is between the ages of 15 and 64 and 2 038 of the population is older than 65 years. » Coloureds comprise the predominant population group within the Hantam LM. » Within the Hantam LM 83.4% of the population is coloured, 11% is white, 4.9% is Black African and 0.6% is Asian. » The dominant language spoken in the Hantam LM is Afrikaans at 93.1%. The remaining spoken languages in the area includes English (1%), IsiNdebele (0.1%), IsiXhosa (0.6%), IsiZulu (0.1%), Sesotho (0.1%), Setswana (0.4%), Sign Language (0.4%) and Tshivenda (0.1%). » The Hantam LM, Namakwa 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 Hantam LM has a dependency ratio of 62.0. The dependency ratios of the Namakwa DM is 47.1, the Northern Cape Province is 35.8, and South Africa is 34.5. » Education levels within the Hantam LM are 3 068 of the population has No Schooling, 2 451 has Matric and 1056 has a higher education. » The population within the working age (15-64) is 13 508, with 5 165 people employed, 802 people unemployed and 5 646 people not economically active. » In 2011, the unemployment rate was highest across the Northern Cape at 27.4% and lowest across the Namakwa DM at 20.1%. » The number of indigent households in the Hantam LM area is, on average, between 35% and 40% of all households with the most of these households living in Calivinia. » 96.8% of the Hantam LM population live in formal dwellings and 2.5% live in informal dwellings. » The primary economic sectors within the Hantam LM include agriculture, tourism and mining.
Services
» The two hospitals are available within the Namakwa DM which includes the Abraham Esau Hospital in Calvinia and the Dr Van Niekerk Hospital in Springbok. The Hantam LM houses two community health centres, three clinics and one small district hospital.

[24] While information was derived from the Local Government Handbook South Africa 2019, Northern Cape PSDF, Namakwa DM and Khâi-Ma LM IDP, 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 majority of households within the Hantam LM are well serviced with regards to flush toilets connected to sewage, refuse removal, piped water and electricity.

7.7 Visual Considerations

7.7.1 Landscape Character

The entire proposed project site for Kutolo Tsatsi PV1 is located in a rural area, currently zoned as agriculture.

The topography of the study area is flat and homogenous, consisting of *lowlands with hills*. Elevation ranges from 870m above sea level (masl.) in the south and north to 970masl in the central study area. There are no prominent hills within the study area, but the proposed site is located on a local high lying area.

No prominent permanent drainage lines are present in the study area, but a large number of non-perennial streams and wetlands are to be found, draining from the higher lying areas to the flatter, lower lying parts of the study area.

Land use within the study area is limited to grazing (sheep), and land cover consists mostly of grassland and *shrubland*. Very limited *woodland* and *thicket and shrubland* areas are present in the north and south of the study area respectively. Patches of *bare rock and soil* are also present in the centre of the study area.

The majority of the study area is sparsely populated (less than ten people per km2 within the Namakwa District Municipality) and consists of a landscape of wide-open expanses and extreme isolation. The scarcity of water and other natural resources has influenced settlement patterns within this region, keeping numbers low, and distribution limited to the availability of permanent water. Settlements, where they occur, are usually rural homesteads and farmsteads.

A single main road (i.e. the R27) services the study area. Other roads are secondary roads linking with one another and with the R27, giving access to the farmsteads.

Infrastructure within the study area includes the Aries-Helios 1 400kV overhead power line and a freight railway line (**Figure 7.8**). Both the railway line and the power line traverse the study area from the south-west to the north-east at distances of respectively 13km and 4.4km from the proposed development site

Figure 7.8: Existing Aries/Helios 1 400kV overhead power line.

There are no formally protected or conservation areas or major tourist attractions or resorts present within the study area. The greater environment has a largely natural and undeveloped character.

The visual quality of the receiving environment within the study areas is high, by virtue of the vast and undeveloped nature of the environment. This lends a distinct sense of place to the area, but the landscape is not unique.

CHAPTER 8. ASSESSMENT OF IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct and indirect) expected to be associated with the development of Kotulo Tsatsi Energy PV1. This assessment has considered the construction of a PV facility with a contracted capacity of up to 200MW with a development footprint of approximately 810ha in extent. The project will comprise the following key infrastructure and components:

- Solar PV array footprint comprising of:
  - PV modules and mounting structures
  - Inverters and transformers
  - Integrated Energy Storage System (IESS)[25]
  - Cabling between the project components
  - Internal access roads
- Access roads, internal distribution roads and fencing around the development footprint
- Admin block comprising of:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Assembly plant
  - Laydown areas

A facility development footprint including the associated infrastructure has been proposed by the developer through consideration of the sensitive environmental features and areas identified during the Scoping Phase. The development envelope, inclusive of the development footprint, has been considered and assessed as part of the EIA Phase by the independent specialists and the EAP (and is illustrated in **Figure 8.1**). On-site sensitivities were identified through the review of existing information, desktop evaluations and field surveys.

The assessment of the PV facility on the site is to support the technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the following previously authorised infrastructure as part of the Kotulo Tsatsi CSP 1 project[26] will be retained for use for the planned PV facility, and the associated footprint areas of the following previously authorised infrastructure has not been reassessed in this EIA[27]:

- Complete grid connection to Aries Substation:
  - Grid connection via a previously authorised grid connection solution, which consists of internal grid reticulation, a collector substation, switching substation and a power line to the Eskom Aries Substation located north-east of the project site.
- Other associated infrastructure:

[25] The capacity of the storage system will be 800MWh which is 4 hours of storage capacity.

[26] DEFF Ref: 14/12/16/3/3/2/694/1

27 The associated footprint areas of the following previously authorised infrastructure have not been reassessed in this EIA, but where relevant, are shown on the figures to provide a complete view of the planned facility.

- facility man camp (including on-site accommodation),
- all water reservoirs and pipelines,
- power block and thermal storage solution.

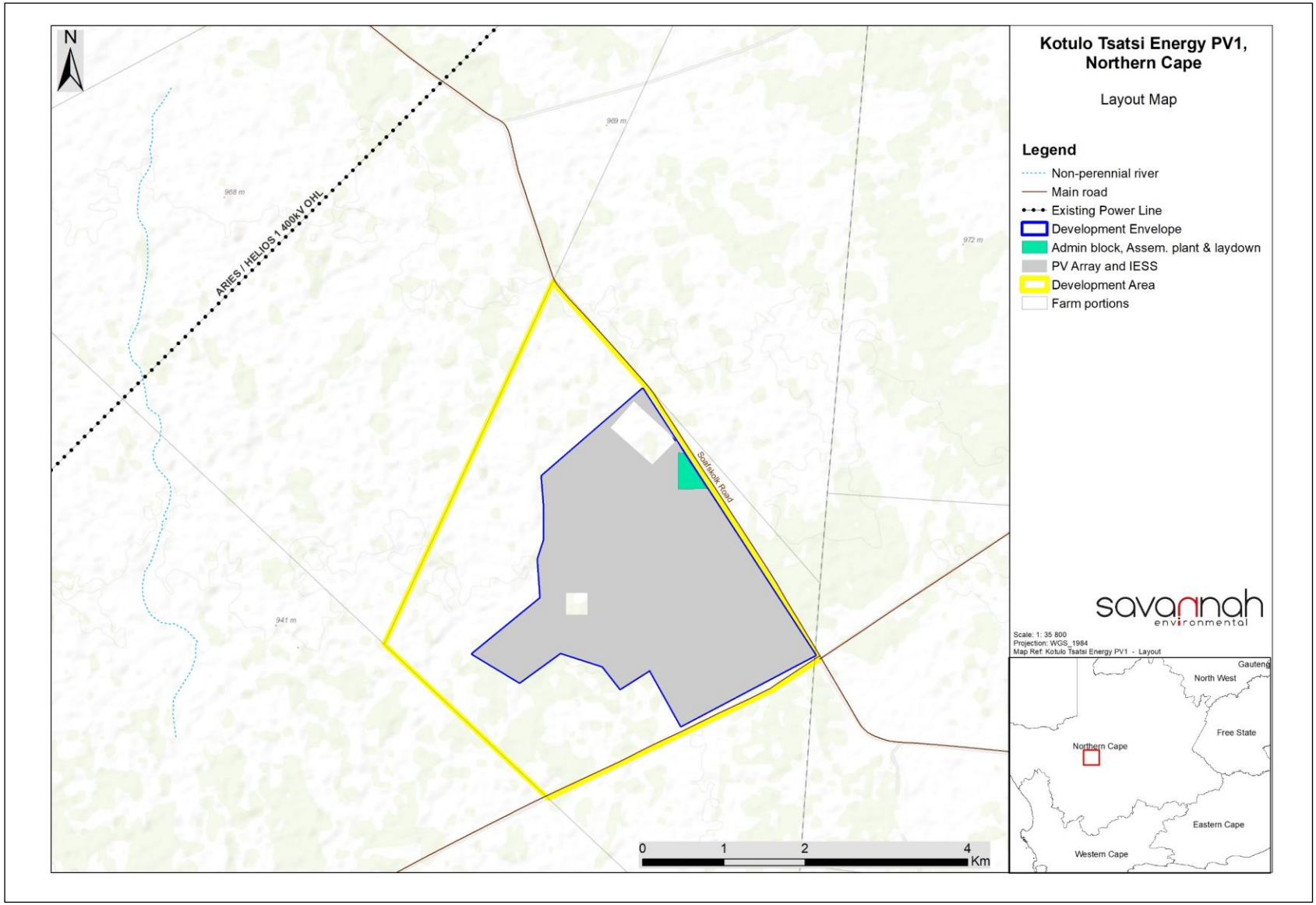

Figure 8.1: Map illustrating the facility layout considered for Kotulo Tsatsi Energy PV1 and as assessed in this EIA report

The development the Kotulo Tsatsi Energy PV1 facility will comprise the following phases:

- *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads, laydown areas, and facility infrastructure (including PV panels and IESS); construction of foundations involving excavations; the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase is estimated at 12 - 18 months.
- *Operation* – will include the operation of the PV1 facility and the generation of electricity. The electricity generated will be fed into the national grid via the on-site substation (authorised as part of the CSP 1 facility and an overhead power line (authorised). The operation phase is expected to be approximately 20 years (with maintenance).
- *Decommissioning* – depending on the economic viability of the Kotulo Tsatsi PV1 facility, the length of the operation phase may be extended beyond a 20-year period. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the facility, clearance of the relevant infrastructure at the site and appropriate disposal thereof, and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities. Where relevant. these impacts have been assessed separately by some specialists.

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

Environmental impacts associated with the operation phase includes soil contamination and erosion and potential invasion by alien and invasive plant species. Other impacts associated with the operation phase include visual impacts and night time lighting impacts.

From the specialist studies undertaken, the following aspects do not require any further assessment:

Soils and Agricultural Potential

The determined land capabilities and climate capabilities of soils identified in the area, are associated with very restricted and very low land potential levels. No "High" land capability sensitivities were identified within the project area, including the development envelope. Considering the low sensitivity of the area to be affected by the project, the proposed activities will have an acceptable impact on agricultural productivity. It is therefore the specialist's opinion that the proposed activities may proceed as planned without the concern of loss of high sensitivity land capabilities or agricultural productivity (refer to **Appendix G** for a compliance statement).

8.1. Quantification of Areas of Disturbance on the Site

Site-specific impacts associated with the construction and operation of the Kotulo Tsatsi PV1 facility relate to the direct loss of vegetation and species of special concern, disturbance of animals (including avifauna) and loss of habitat, and impacts to freshwater features. In order to assess the impacts associated with Kotulo Tsatsi PV1 facility, it is necessary to understand the extent of the affected area.

The project footprint being assessed for Kotulo Tsatsi PV1 requires an area of approximately 810ha of which the PV array and IESS will occupy an area of approximately 785ha in extent, while supporting infrastructure such on-site buildings and structures will occupy up to 7.5ha. The remaining extent of the development envelope is occupied by the already authorised infrastructure (including a power block (5ha) and substations (12ha)).

8.2. Potential Impacts on Ecology (Ecology, Flora and Fauna)

Potential ecological impacts resulting from the proposed development of Kotulo Tsatsi Energy PV1 and associated infrastructure would stem from a variety of different activities and risk factors associated with the pre-construction, construction and operation phases of the project. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details).

8.2.1 Results of the Ecological Impact Assessment

In terms of vegetation, the site is not considered highly sensitive as the affected vegetation type, Bushmanland Basin Shrubland, is widely distributed and the abundance of species of conservation concern within the affected area is low. Also, due to the homogenous nature of the habitat for fauna, faunal diversity in the area is low and faunal species of concern are not likely to be abundant at the site.

An ecological sensitivity map of the Kotulo Tsatsi Energy PV1 development envelope is illustrated in **Figure 8.2** below. Most of the development footprint is within low sensitivity areas consisting of sparse, arid shrubland on shallow soils. However, there are also some medium sensitivity minor washes and high sensitivity large washes present within the development footprint. No areas or features of a very high sensitivity have been identified.

Although the high sensitivity areas are not considered no-go areas, development in these areas should be subject to certain constraints regarding the clearing of vegetation. The high sensitivity areas represent broad flat-bottomed sandy washes dominated by *Rhigozum trichotomum*.

The development envelope falls outside of any CBAs, ESAs and NC-PAES focus areas with the result that impacts on CBAs and the ability to meet future conservation targets would be minimal.

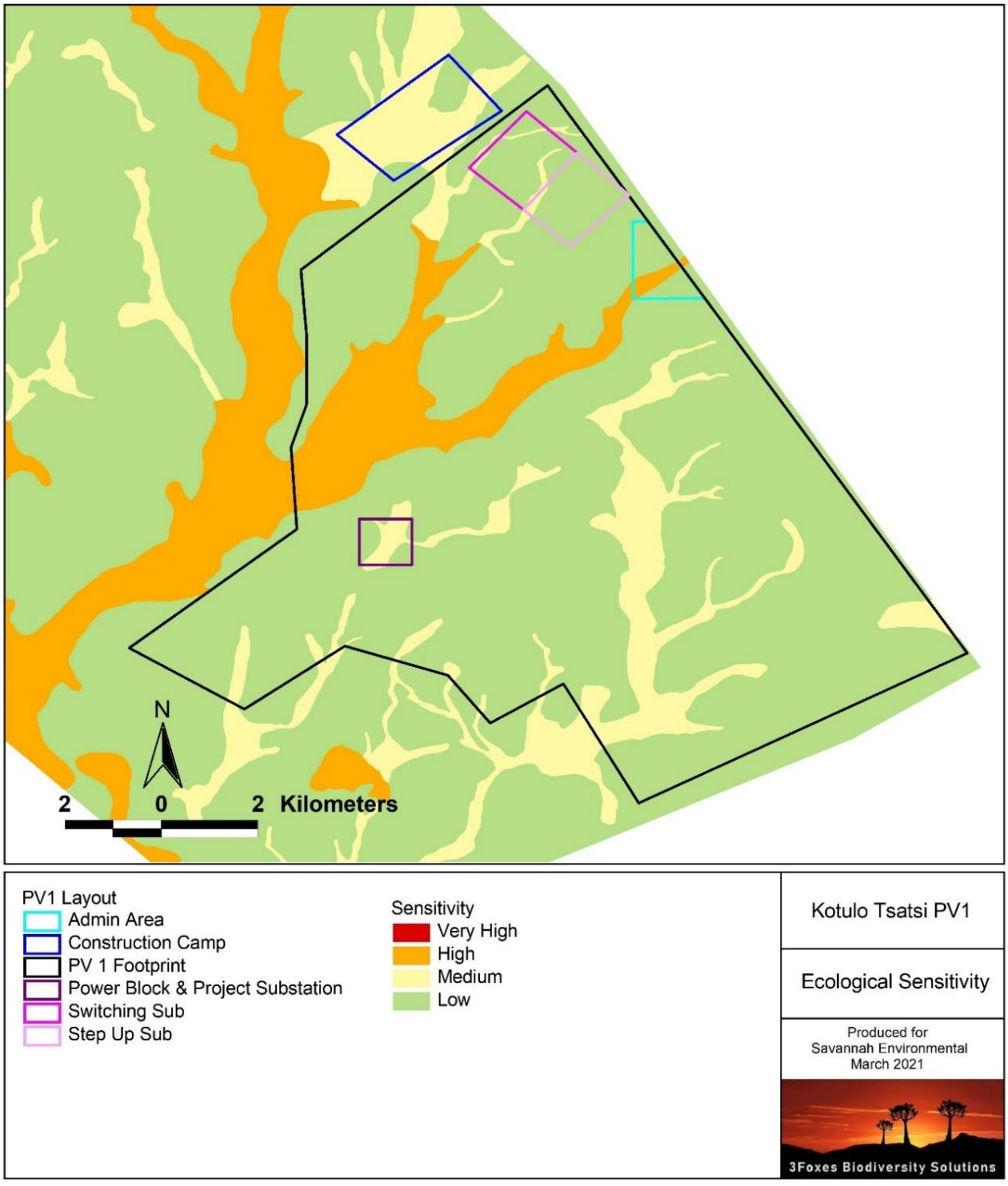

Figure 8.2: Sensitivity map for the PV1 development envelope and associated infrastructure

8.2.2 Description of Ecological Impacts

Potential impacts on the ecology of the development envelope due to Kotulo Tsatsi Energy PV 1 would stem from a variety of activities and risk factors associated with the construction and operation phases of the project. The potential impacts associated with the development are explored in context of the features and characteristics of the site and the likelihood that each impact would occur given the characteristics of the site and the extent and nature of the development.

» Impacts on vegetation and protected species
Vegetation clearing during construction will lead to the loss of currently intact habitat within the proposed development footprint and is an inevitable consequence of the proposed development. As this impact is certain to occur it will be assessed for the construction phase as this is when the impact will occur, although the consequences will persist for a long time after construction.

» Direct faunal impacts
Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna would move away from the area 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 construction as well as operation and this impact will therefore be assessed for the construction and operation phases.

» Increased erosion risk
The disturbance created during construction would leave the site vulnerable to wind and water erosion. Soil disturbance associated with the development will render the impacted areas vulnerable to erosion and measures to limit erosion will need to be implemented. This impact is likely to manifest during construction and would persist into the operation phase and should therefore be assessed for both phases.

» Alien plant invasion
The disturbance associated with the construction phase of the project will render the disturbed areas vulnerable to alien plant invasion. Some woody aliens such as *Prosopis* are already present in the area and additional alien plant invasion following construction is likely. Once the natural vegetation has returned to the disturbed areas, the site will be less vulnerable to alien plant invasion. This impact would manifest during the operation phase, although some of the required measures to reduce this impact are required during construction.

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

Construction Phase

Nature: *Impacts on vegetation and listed or protected plant species resulting from construction activities* Impacts on vegetation will occur due to disturbance and vegetation clearing associated with the construction of the facility. In addition, there is likely to be some loss of individuals of protected plant species.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (4)	Low (3)
Probability	Definite (5)	Definite (5)
Significance	**Medium (45)**	**Medium (40)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low

Can impacts be mitigated?	This impact cannot be mitigated well because the loss of vegetation and any individuals of protected species is unavoidable and is a certain outcome of the development.

Mitigation:

- Pre-construction walk-through of the facility's final layout 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 permit conditions.
- Search and rescue for identified species of concern before construction.
- Vegetation clearing to commence only after walk-through has been conducted and necessary permits obtained.
- Pre-construction environmental induction must be provided for all construction staff 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, 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 to be kept to a minimum. No unnecessary vegetation to be cleared.
- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
- Temporary laydown areas should 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:

- As the loss of currently intact vegetation is an unavoidable consequence of the development, the habitat loss associated with the development remains a moderate residual impact even after mitigation and avoidance of more sensitive areas.

Nature: *Direct Faunal Impacts due to Construction Activities*

Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction. Due to noise and operation of heavy machinery, faunal disturbance will extend well beyond the footprint and extend into adjacent areas. 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 (5)	Low (3)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (32)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Although noise and disturbance generated at the site during construction is largely unavoidable, impacts such as those resulting from the presence of construction personnel at the site can be readily 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 should be removed to safety by an appropriately qualified environmental officer.

- All construction vehicles must adhere to a low speed limit 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 trenches need to be dug for electrical cabling or other purpose, these must not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open must have places where there are soil ramps allowing fauna to escape the trench.

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

Nature: *Faunal Impacts due to Operation*

The operation and presence of the facility may lead to disturbance or persecution of fauna within or adjacent to the facility

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
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 during maintenance is likely.	

Mitigation:

- Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities must be removed to a safe location.
- If the site must be lit at night for security purposes, this must be done with downward-directed low-UV type lights (such as most LEDs or HPS bulbs), 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 accessing the site must adhere to a low speed limit (30km/h max for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises.
- If the facility 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 as is the case on the majority of already constructed PV plants.

Residual Impacts:

- Disturbance from maintenance activities will occur at a low level with the result that disturbance would be largely restricted to the site.

Nature: *Habitat Degradation due to Erosion*

Disturbance created during construction will leave the site and its immediate surroundings vulnerable to erosion for several years into the operation phase.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (2)	Short-term (1)
Magnitude	Medium (4)	Low (3)
Probability	Likely (4)	Likely (3)
Significance	**Low (28)**	**Low (15)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	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 at the site must take place according to the Erosion Management Plan and Rehabilitation Plan. This should make provision for annual monitoring and rehabilitation.
» All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
» There must follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs, grasses and trees from the local area.

Residual Impacts:

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

Nature: *Habitat Degradation due to Alien Plant Invasion*

Disturbance created during construction will leave the site and its immediate surroundings vulnerable to alien plant invasion for several years into the operation phase.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (2)	Short-term (1)
Magnitude	Medium (4)	Low (2)
Probability	Likely (4)	Likely (3)
Significance	**Low (28)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	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:

» 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.
» Regular (annual) monitoring for alien plants during operation must be undertaken to ensure that no alien invasive problems have developed as result of the disturbance, as per an 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.

Residual Impacts:

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

Decommissioning Phase

Nature: *Habitat Degradation due to Erosion* Disturbance created during decommissioning will leave the site vulnerable to erosion for several years.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium (4)	Low (3)
Probability	Likely (4)	Likely (3)
Significance	**Medium (36)**	**Low (21)**
Status (positive or negative)	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 at the site must take place according to the Erosion Management Plan and Rehabilitation Plan. This should make provision for annual monitoring and rehabilitation. » 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.		
Residual Impacts: » Some erosion is likely to occur even with the implementation of control measures, but would have a low impact if effectively managed.		

Nature: *Habitat Degradation due to Alien Plant Invasion* Disturbance created during decommissioning will leave the site vulnerable to plant invasion for several years.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium (4)	Low (2)
Probability	Likely (4)	Likely (3)
Significance	**Medium (36)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	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: » There must be rehabilitation and revegetation of all cleared areas remaining after decommissioning 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 should make provision for alien monitoring and management for at least 5 years after decommissioning.		

» Regular (annual) monitoring for alien plant during operation to ensure that no erosion problems have developed as result of the disturbance, as per the Decommissioning 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.
Residual Impacts: » Some alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact if effectively managed

Nature: *Faunal Impacts due to Operation*

The operation and presence of the facility may lead to disturbance or persecution of fauna within or adjacent to the facility

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	**Low (28)**	**Low (18)**
Status (positive or negative)	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 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 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 removed from the site as part of decommissioning. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
» 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.

8.2.4 Implications for Project Implementation

With the implementation of mitigation the impacts associated with ecology are of low significance, depending on the impact. In terms of vegetation, the site is not considered highly sensitive as the affected vegetation type, Bushmanland Basin Shrubland, is widely distributed and the abundance of species of conservation concern within the affected area is low. The majority of the site consists of sparse, arid

shrubland on shallow soils, considered to be of low sensitivity, there are also some medium and high sensitivity washes present. Although some development in these areas is considered acceptable, some caution should be exercised regarding vegetation clearing in these areas as wholescale clearing is likely to leave these areas vulnerable to erosion as these areas receive runoff from the adjacent slopes and the PV development is likely to significantly increase runoff. Since, clearing and disturbance in these areas would potentially increase the erosion potential, to allow for some protection against erosion, it is recommended that if these larger wash areas cannot be avoided, that the vegetation is not clipped below 50cm in height.

Also, the surrounding habitat is very homogenous, the habitat loss resulting from the development would not result in significant local habitat loss for fauna or disrupt any broader scale movement corridors for fauna. Consequently, there are no highly significant impacts present at the site which cannot be mitigated to a low level and which would represent a red flag for the development, and the development is considered acceptable from an ecological perspective.

8.3. Assessment of Impacts on Freshwater

The impacts on freshwater features (including minor and major washes, and wetlands) associated with the development was assessed to ascertain the significance of potential impacts on the key drivers and receptors (hydrology, water quality, geomorphology, habitat, and biota) of these freshwater features. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** for more details).

8.3.1 Results of the Freshwater Impact Assessment

Based on the layout of the proposed PV1 facility several drainage features have been identified within the project area as well as the development envelope (**Figure 8.3**). A summary of the ecological importance and sensitivity of these identified drainage feature is provided below.

» *Depression wetland*
The depression wetland is considered to be of high ecological importance and sensitivity as it aids in providing important ecosystem functions such as, capturing runoff, providing habitat for important and unique invertebrates, providing feeding sites for local and migrating faunal species etc. Due to the ephemeral nature of the wetland it will be fairly sensitive to further reductions and changes in the natural hydrological regime. This may have a significant impact on the floral composition of these areas and may result in a reduction in water supply and a collapse in invertebrate populations.

» *Major Ephemeral Streams/Washes*
All major ephemeral streams/washes are considered to be of high ecologically importance and sensitivity. These washes contribute slightly to diversity in vegetation and geomorphological structure but more significantly to patchiness. Furthermore, these systems may contain important/unique invertebrate populations, serve as important migration routes and corridors, especially the more extensive habitats, and provide important ecosystem services.

» *Smaller Ephemeral Washes/Streams and Drainage Features*

All smaller ephemeral washes and drainage channels are considered to be of moderate ecologically importance and sensitivity. These systems convey floodwater into and out of the ecologically important and sensitive larger washes and subsequently play an important role in the maintenance of these more important systems.

A recommended buffer of 30m has been identified for high and very high sensitivity freshwater features. The buffer is in line with the flat terrain (i.e. a flatter slope will mean that water flowing across the buffer will flow slowly, thus increasing the chance of sediment and pollutants settling out, and increasing the effectiveness of the buffer).

8.3.2 Description of the Impacts to Watercourses

Based on the proposed layout, direct and potential indirect loss of / or damage to freshwater resources may occur during the construction, operation and decommissioning phases of the project. This will lead to localised loss of freshwater resources and may lead to downstream impacts that affect a greater extent of freshwater resources or impact on function and biodiversity. Where these habitats are already stressed due to degradation and transformation, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat.

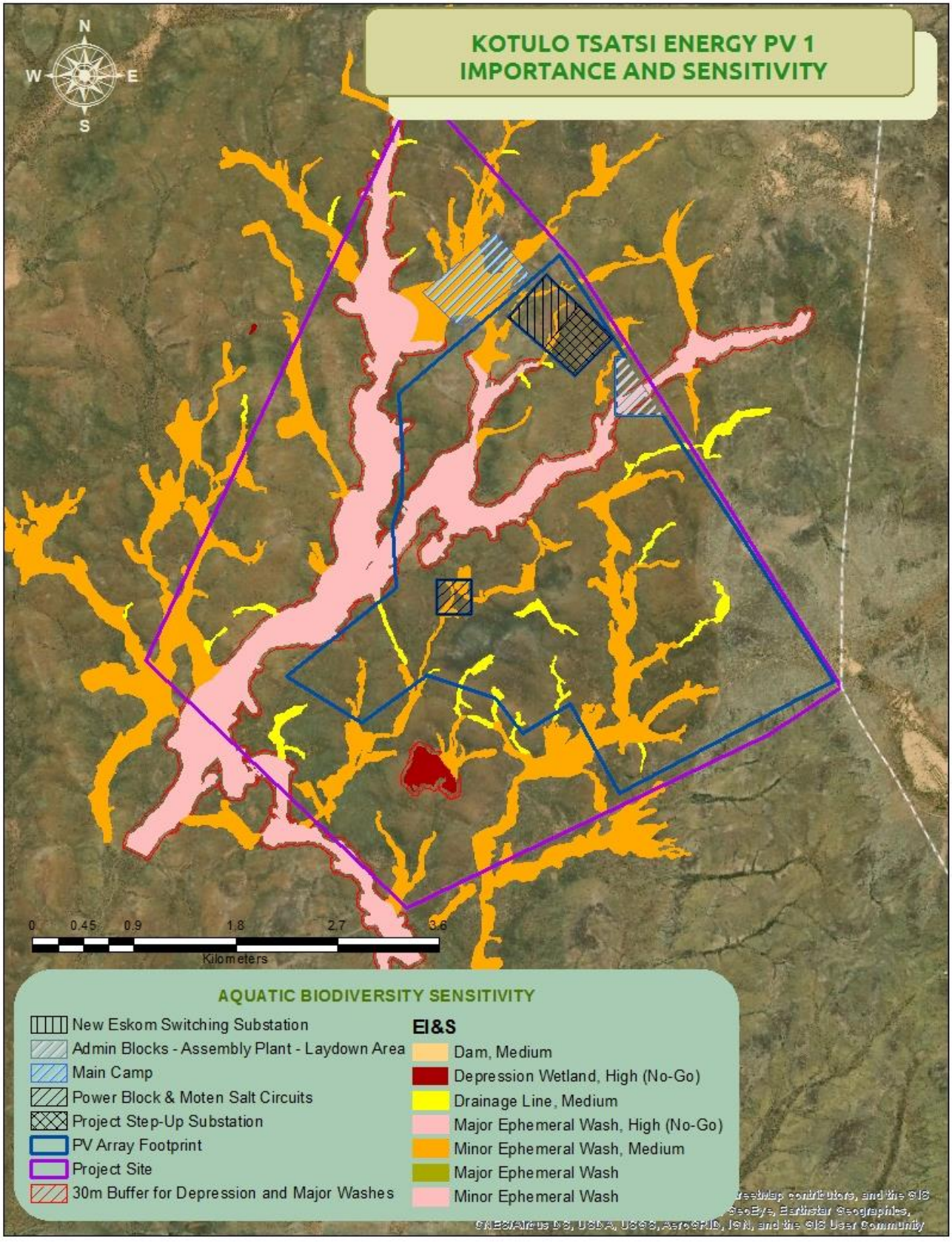

Figure 8.3: Ecological importance and sensitivity rating of drainage features associated with the Kotulo Tsatsi PV1 development area and development envelope

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

Nature: *Loss of riparian systems and disturbance of the alluvial watercourses during the construction, operation and decommissioning phases.*

This refers to the direct physical destruction or disturbance of aquatic habitat caused by vegetation clearing, disturbance of habitat, encroachment/colonisation of habitat by invasive alien plants and alteration of geomorphological profiles (including stream beds and banks). Possible ecological consequences associated with this impact may include:

- Reduction in representation and conservation of freshwater ecosystem/habitat types;
- Reduction in the supply of ecosystem goods and services;
- Reduction/loss of habitat for aquatic dependent flora and fauna; and
- Reduction in and/or loss of species of conservation concern (i.e. rare, threatened/endangered species).

As the current layout includes some freshwater resource features including high sensitive larger ephemeral washes, this impact is likely to occur on-site. The placement of PV panels or any hard surface within the riparian habitat will result in the direct disturbance/replacement/loss of the of riparian zones and alluvial watercourses, being replaced by hard engineered surfaces.

Furthermore, the physical removal of the riparian zones and disturbance of any alluvial watercourses by new road crossings or upgrades of existing roads, as well as by cable crossings are likely within the watercourses within the site.

These disturbances will be the greatest during the construction and again in the decommissioning phases as the related disturbances could result in loss and/or damaged vegetation.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Minor (3)
Probability	Definite (5)	Definite (5)
Significance	**Medium (60)**	**Medium (40)**
Status (positive or negative)	Negative	Negative
Reversibility	Low – Destruction of riparian vegetation will not be remedied easily.	Low – Destruction of riparian vegetation will not be remedied easily.
Irreplaceable loss of resources?	Local loss of resources	Very limited loss of resources
Can impacts be mitigated?	To some degree, mainly through avoidance of high sensitivity areas and associated buffers.	

Mitigation:

- The highly sensitive major ephemeral washes and their associated buffer areas must be regarded as no-go areas for all construction activities apart from road construction/upgrading and lying of cables, and only where the use of existing access roads is not an option.
- The recommended buffer areas between the delineated freshwater resource features and proposed project activities must be maintained.
- Vegetation within the medium sensitive freshwater resource features must be allowed to persist as far as possible, with only the larger shrubs being trimmed.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation must be cleared.
- Vegetation clearing must occur in a phased manner to minimise erosion and/or run-off.
- Avoid placing any construction camps, laydown areas, substation or any buildings or storage facilities within the medium sensitive features. Construction of PV panels, access roads and underground cables are acceptable with the implementation of the mentioned mitigation measures.

- Any areas disturbed during the construction phase must be encouraged to rehabilitate as fast and effective as possible and were deemed necessary by the ECO or Contractor's EO, artificial rehabilitation (e.g. re-seeding with collected or commercial indigenous seed mixes) must be applied in order to speed up the rehabilitation process in critical areas (e.g. steep slopes and unstable soils).
- Existing roads must be used as far as possible within the high sensitive features, with new crossings being avoided as far as possible. Where no existing crossings are available the construction of new crossings can be considered:
    - Where new water course crossings are required, the engineering team must provide an effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) as well as minimise the loss of riparian vegetation (reduce the footprint as much as possible).
    - All crossings over watercourses must be such that the flow within the channels is not impeded and must be constructed perpendicular to the river channel,
    - Where new roads need to be constructed, the existing road infrastructure must be rationalised and any unnecessary roads decommissioned and rehabilitated to reduce the disturbance of the area within the river beds.
- For construction within the smaller ephemeral washes and drainage features (medium sensitive freshwater resource features):
    - During the construction and operation/decommissioning phase, monitor these drainage features to see if erosion issues arise and if any erosion control is required.
    - Any areas disturbed during the construction phase must be encouraged to rehabilitate as fast and effective as possible and were deemed necessary by the ECO or Contractor's EO, artificial rehabilitation (e.g. re-seeding with collected or commercial indigenous seed mixes) must be applied in order to speed up the rehabilitation process in critical areas (e.g. steep slopes and unstable soils).
    - All alien plant re-growth must be monitored and should it occur these plants should be eradicated.
    - Road infrastructure and cable alignments must coincide as far as possible to minimise the impact.
    - During decommissioning, disturbance to the freshwater ecosystems must be limited as far as possible.
    - Disturbed areas may need to be rehabilitated and revegetated.
    - Mitigation and follow up monitoring of residual impacts (alien vegetation growth and erosion) may be required, and must be implemented as necessary.

Residual:

- Locally altered vegetation structure.
- Without the implementation of mitigation measures, there is a possible impact on the remaining catchment due to changes in run-off characteristics in the development footprint

Nature: *Impact on riparian systems through the increase in surface runoff on riparian form and function during the operation and decommissioning phases*

The PV facility will include the addition of hardened areas through the establishment of impermeable surfaces as well as some compaction of soils may occur due to site works. Service roads and temporary construction areas have the potential to further increase areas of hardening. The substation and additional support buildings will increase hardened surfaces. The aforementioned will increase the runoff generated on site due to the addition of areas of hard surfaces and could lead to increased flood peaks downstream with increased flood risk and erosion risk, potentially reducing or disturbing important/sensitive downstream riparian habitats.

	Without mitigation	**With mitigation**
Extent	Local & downstream (3)	Local (2)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Moderate (7)	Moderate (6)
Probability	Definite (5)	Improbable (2)
Significance	**High (70)**	**Low (22)**
Status (positive or negative)	Negative	Negative

Reversibility	Low – Destruction of riparian vegetation will not be remedied easily.	Low – Destruction of riparian vegetation will not be remedied easily.
Irreplaceable loss of resources?	Local and downstream loss of resources	Limited loss of local resources
Can impacts be mitigated?	To some degree, mainly through avoidance of high sensitivity areas and associated buffers and through the implementation of an effective stormwater management plan.	

Mitigation:

- The highly sensitive major ephemeral washes and their associated buffer areas must be regarded as no-go areas for all construction activities apart from road construction/upgrading and lying of cables, and only where the use of existing access roads is not an option.
- The recommended buffer areas between the delineated freshwater resource features and proposed project activities must be maintained.
- Vegetation clearing must be kept to a minimum. No unnecessary vegetation must be cleared.
- Vegetation clearing should occur in in a phased manner to minimise erosion and/or run-off.
- Vegetation within the medium sensitive freshwater resource features must be allowed to persist as far as possible, with only the larger shrubs being trimmed.
- Infrastructure footprint and associated area of disturbance must be minimised as far as practically possible.
- Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities.
- Stormwater from hard stand areas, buildings and substation must be managed using appropriate channels and swales when located within steeper areas.
- The runoff must be dissipated over a broad area covered by natural vegetation or managed using appropriate channels and swales.
- Stormwater run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any stormwater leaving the solar PV site.
- The existing road infrastructure must be utilised as far as possible to minimise the overall disturbance.
- Where new roads need to be constructed, the existing road infrastructure must be rationalised and any unnecessary roads decommissioned and rehabilitated in order to reduce the total area of hardened, bare areas within the property.
- No stormwater runoff must be allowed to discharge directly into any watercourse along roads, and flows must therefore be allowed to dissipate over a broad area covered by natural vegetation.

Residual:

Altered streambed morphology, however due to the extent and nature of the development this residual impact is unlikely to occur.

Nature: *Increase in sedimentation and erosion during the construction, operation and decommissioning phase*

For the construction and decommissioning phases this refers to the alteration in the physical characteristics of freshwater resource features as a result of increased turbidity and sediment deposition, caused by soil erosion and earthworks that are associated with construction activities. Possible ecological consequences associated with this impact may include:

- Deterioration in freshwater ecosystem integrity; and
- Reduction/loss of habitat for aquatic dependent flora and fauna.

This may furthermore, influence water quality downstream.

The proposed development will require clearing of existing vegetation and disturbance of soils, specifically for the installation of foundations for PV modules, access roads, electrical cabling, substation, buildings and laydown areas. The solar panels will increase shading of the surface and may result in a decrease in vegetation cover. Disturbed or

exposed soils will increase the likelihood of soil erosion and subsequent potential sedimentation of downstream watercourses during significant rainfall events. Runoff from individual solar panels may result in increased potential soil erosion below panels (this potential erosion may be enhanced by panel maintenance which includes regular washing). The site is, however, located in a low rainfall area of South Africa which will reduce the potential impact with the mild topography also reducing the erosivity of runoff.

	Without mitigation	**With mitigation**
Extent	Local & downstream (3)	Local (1)
Duration	Long-term (4)	Very Short Duration (1)
Magnitude	Moderate (7)	Moderate (6)
Probability	Highly Probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (16)**
Status (positive or negative)	Negative	Slightly negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Local and potential loss of downstream resources	Unlikely
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- The highly sensitive major ephemeral washes and their associated buffer areas must be regarded as no-go areas for all construction activities apart from road construction/upgrading and lying of cables, and only where the use of existing access roads is not an option.
- The recommended buffer areas between the delineated freshwater resource features and proposed project activities must be maintained.
- Vegetation clearing must be kept to a minimum. No unnecessary vegetation must be cleared.
- Vegetation clearing must occur in in a phased manner to minimise erosion and/or run-off.
- Vegetation within the medium sensitive freshwater resource features must be allowed to persist as far as possible, with only the larger shrubs being trimmed.
- Any erosion problems observed to be associated with the project infrastructure must be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- All bare areas, as a result of the development, must be revegetated with locally occurring species, to bind the soil and limit erosion potential.
- Site rehabilitation must aim to restore surface drainage patterns, natural soil and vegetation as far as is feasible.
- An erosion control management plan must be utilised to prevent erosion.
- There must be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads must occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.
- Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities
- Stormwater from hard stand areas, buildings and substation must be managed using appropriate channels and swales when located within steep areas.
- Erosion control measures such as silt fences (for areas of works) and gravel strips may be considered at the impact zone where water falls from the solar panels onto the soil surface (due to deterioration in natural shrubland because of poor maintenance or lack of solar radiation).
- Stormwater run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any stormwater leaving the Solar PV site.
- The existing road infrastructure must be utilised as far as possible to minimise the overall disturbance created by the solar PV Facility.
- Silt traps must be used where there is a danger of topsoil eroding and entering streams and other sensitive areas.
- Construction of gabions and other stabilisation features must be implemented to prevent erosion, if deemed necessary.
- No stormwater runoff must be allowed to discharge directly into any watercourse along roads, and flows must therefore be allowed to dissipate over a broad area covered by natural vegetation.

» Containers carrying batteries (if present) must be regularly checked for leaks. If leaks are found, these containers must be repaired, replaced immediately with leaked chemicals cleaned up as soon as possible. » Store hydrocarbons off site where possible, or otherwise implement hydrocarbon storage using impermeable floors with appropriate bunding, sumps and roofing. » Handle hydrocarbons carefully to limit spillage. » Ensure vehicles are regularly serviced so that hydrocarbon leaks are limited. » Designate a single location for refuelling and maintenance, outside of any freshwater resource features. » Keep a spill kit on site to deal with any hydrocarbon leaks. » Remove soil from the site which has been contaminated by hydrocarbon spillage.
Residual: Altered streambed morphology, however due to the extent and nature of the development this residual impact is unlikely to occur.

8.3.4 Implications for Project Implementation

According to the current layout of the development footprint, some medium sensitivity minor washes and drainage lines as well as some high sensitivity larger washes will be directly impacted by the development. The high sensitivity areas along with their 30m buffers are considered as no-go areas for all infrastructure except for access roads. The layout therefore needs to be adjusted in order to avoid the high/no-go areas in order to be acceptable from a freshwater perspective. The medium sensitive minor washes and drainage lines are not considered no-go areas. However, development within these areas shall be subjected to strict mitigation measures including the management of surface water runoff, erosion monitoring and mitigation as well as constraints regarding the clearing of vegetation within these areas.

8.4. Potential Impacts on Avifauna

Potential impacts on avifauna and the relative significance of the impacts associated with the construction and operation the Kotulo Tsatsi Energy PV1 facility are summarised below (refer to **Appendix E** for more details).

8.4.1 Results of the Avifauna Impact Assessment

Very low numbers of birds were apparent during the drought years of 2016 and 2020 on site. The proposed PV site therefore holds a very low species richness and abundance, and no Red Data species. From a habitat perspective, the number of birds per kilometre was consistently higher in the dry river washes that supported Rhigozum shrubs, than in the open grassy plains that surrounded them.

A key concern arising from the first surveys and assessment of the full extent of the larger Kotulo Tsatsi site was the presence of an active Martial Eagle nest within 3-4 km of the authorised CSP3 site, although the proposed Kotulo Tsatsi Energy PV1 is located well outside of this buffer area (**Figure 8.4**). The original Martial Eagle nest was not active in the 2020 survey, and a carcass of an adult bird was found below the nest. Another, apparently inactive, Martial Eagle nest was recorded just outside the study area on a tower to the south-western, and a juvenile bird was recorded in the southern section of the larger project site. The presence of this nest and juvenile birds indicates that this area is well-used by Martial Eagles. Passage rates were also lower in the 2020 survey than previous surveys, with 2.5 birds/hour over the Kotulo Tsatsi Energy PV1 site. These low rates are possibly a result of persistent drought in the area.

In February 2021 three species of vultures (Critically Endangered White-backed Vultures, Endangered Lappet-faced Vultures, and Endangered Cape Vulture) were noted within the project area by the specialist[28], and were noted as being transient birds from Namibia (F van der Merwe, M Boorman pers. comm.). Prior to early 2021, there was nothing published on the presence of vultures in the area. These birds are new to the area as evidenced by the national bird atlas data (SABAP2) and the lack of previous vulture records from anywhere south of Kenhardt.

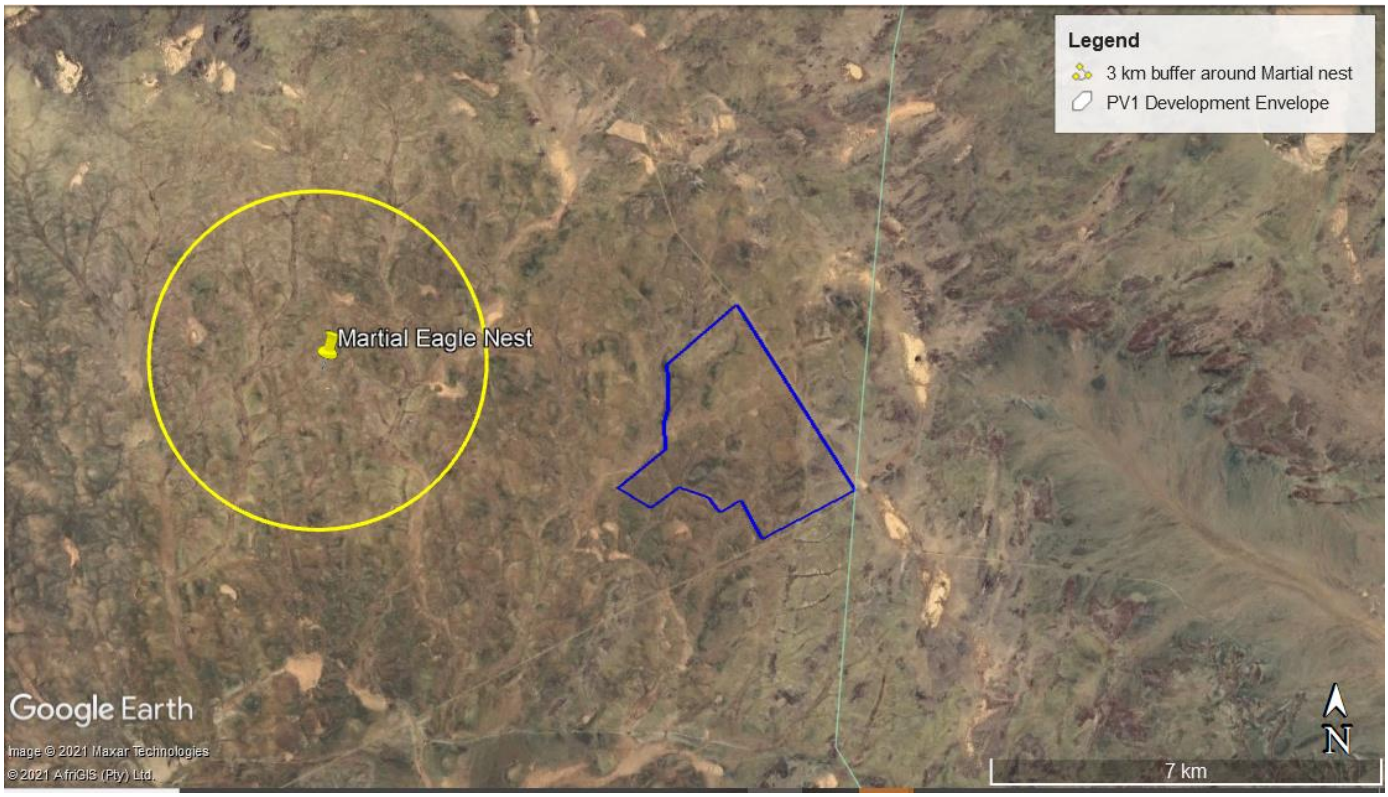

Figure 8.4: Kotulo Tsatsi Energy PV1 in relation to Martial Eagle Nest

8.4.2 Description of Avifaunal Impacts

The potential impact to avifaunal species associated with the activities pertaining to the Kotulo Tsatsi Energy PV1 facility are detailed below**.**

- The impact of the proposed PV area will generally be negative for birds as: (i) habitat will be transformed, and the associated habitat potentially fragmented by roads, and other infrastructure; and (ii) birds may be killed directly if they fly into the solar panel array. Displacement of birds may also occur.
- Impacts during the construction, operation and decommissioning phases are related to direct disturbance and loss of foraging habitat for Red-listed bird groups.

[28] The specialist was in the area undertaking fieldwork for different project, not as part of the assessment for the Kotulo Tsatsi Energy PV1 Assessment

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

Construction Phase

Nature: *Direct disturbance and loss of foraging habitat around the PV site for the Red-listed bird groups* Habitat will be transformed, and the associated habitat potentially fragmented by roads, and other infrastructure.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (1)
Probability	Unlikely (2)	Unlikely (2)
Significance	**Low (14)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes, if areas around active nests are avoided during construction	Yes, if areas around active nests are avoided during construction
Irreplaceable loss of resources?	No, Martial Eagles will return to the area, however there is a risk that these birds will be displaced.	
Can impacts be mitigated?	Yes. If the high-risk areas are avoided within the 3-km eagle nest buffer.	
Mitigation: » No development must take place within the 3-km Martial nest buffer. » Reduce disturbance near active nests, i.e. undertake activities outside the breeding season. » Some of the proposed mitigations above will require further data regarding fatalities in the solar PV site. Therefore it is recommended that: (i) Developer implements 12 months post-construction monitoring to assess the mortality of birds in the solar farm, through direct observation and carcass searches. This will assist in determining where specific mitigation measures are required to be implemented.		
Residual Impacts: » After mitigation, direct mortality through collision, or area avoidance, by the species identified may still occur and further research and mitigation measures must be implemented in the case of Red Data species. This can only be undertaken in conjunction with the systematic monitoring programme suggested.		

Operation Phase

Nature: *Direct impact fatalities, disturbance and loss of foraging habitat around the PV site for the Red-listed bird groups* Birds may be killed directly if they fly into the solar panel array. Displacement may also occur. The Martial Eagle, recorded on within the surrounding area is the raptor species most likely to be impacted because of their high likelihood of occurrence and high proportion of flights over the area.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (1)
Probability	Probable (3)	Unlikely (2)
Significance	**Low (21)**	**Low (12)**

Status (positive or negative)	Negative	Negative
Reversibility	Yes, if the solar development avoids areas identified as high-risk and mitigation occurs in the remaining areas.	Yes, if solar development avoid areas identified as high-risk
Irreplaceable loss of resources?	No, Martial Eagles will return to the area. However there is a risk that these birds will be killed through impact with solar infrastructure.	
Can impacts be mitigated?	Yes. If the high-risk areas are avoided for development	
Mitigation: » Position the solar PV site outside the 3-km high-risk area. » The proposed mitigation above will require further data regarding which solar panels are responsible for most deaths. Therefore, it is recommended that: the Developer implement 12 months post-construction monitoring to assess the mortality of birds in the solar farm, through direct observation and carcass searches. This will assist in determining where individual specific mitigation measures are required to be implemented.		
Residual Impacts: » After mitigation, direct mortality through collision, or area avoidance, by the species identified above may still occur and further research and mitigation measures must be implemented in the case of Red Data species. This can only be undertaken in conjunction with the systematic monitoring programme suggested.		

Decommissioning Phase

Nature: *Direct disturbance and loss of foraging habitat around the PV site for the Red-listed bird groups* Habitat will be transformed, and the associated habitat potentially fragmented.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (1)
Probability	Unlikely (2)	Unlikely (1)
Significance	**Low (14)**	**Low (6)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes, if the veld is rehabilitated	Yes, if the veld is rehabilitated
Irreplaceable loss of resources?	No, Martial Eagles will return to the area. However, there is a risk that these birds will be poisoned if viewed as a risk to livestock.	
Can impacts be mitigated?	Yes. If the high-risk areas are avoided for decommissioning	
Mitigation: » Reduce degree of disturbance and length of disturbance to a minimum during sensitive breeding periods.		
Residual Impacts: » After mitigation, direct mortality, or area avoidance, by the species identified above may still occur and further research and mitigation measures must be implemented in the case of Red Data species. This can only be undertaken in conjunction with the systematic monitoring programme suggested.		

8.4.5 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of avifauna impacts is likely to be of a low impact significance. Most sections of the site held very low species richness and abundance of priority collision-prone birds or Red Data species. This suggests that they will be suitable for PV development. A concern of note is that it is important to understand that the poisoning of the territorial Martial Eagle will not stop this nest from being re-occupied in future years. This

emphasises the need to persist with the nest buffer around the nest. Therefore, the nominal 3km nest buffer is still recommended and in force. It should however be noted that the proposed Kotulo Tsatsi PV1 project does not infringe on this buffer area.

8.5. Assessment of Visual Impacts

Impacts on visual receptors will occur during the undertaking of construction activities and the operation of Kotulo Tsatsi Energy PV1 facility. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I**).

8.6.1 Results of the Visual Impact Assessment

Viewer incidence is calculated to be the highest along the secondary roads within the area surrounding the project. Travellers using these roads may be negatively impacted by visual exposure to the PV facility and have been identified as the most likely sensitive visual receptors. Additional sensitive visual receptors are located at the farm residences (homesteads) between 1km and 6km in the surrounding area. It is expected that the viewer's perception would generally be negative, unless the observer is associated with (or supportive of) the solar energy facility.

Due to the remote location of the site, there are only a few potential sensitive visual receptors located within a 6km radius of the proposed facility (refer to **Figure 8.5**). These are residents of, or visitors to:

- Klaas Job se Vlei (closet receptor)
- Vuursiekvlei 1
- Klerkshoop
- Valsvlei
- Steynsvlei

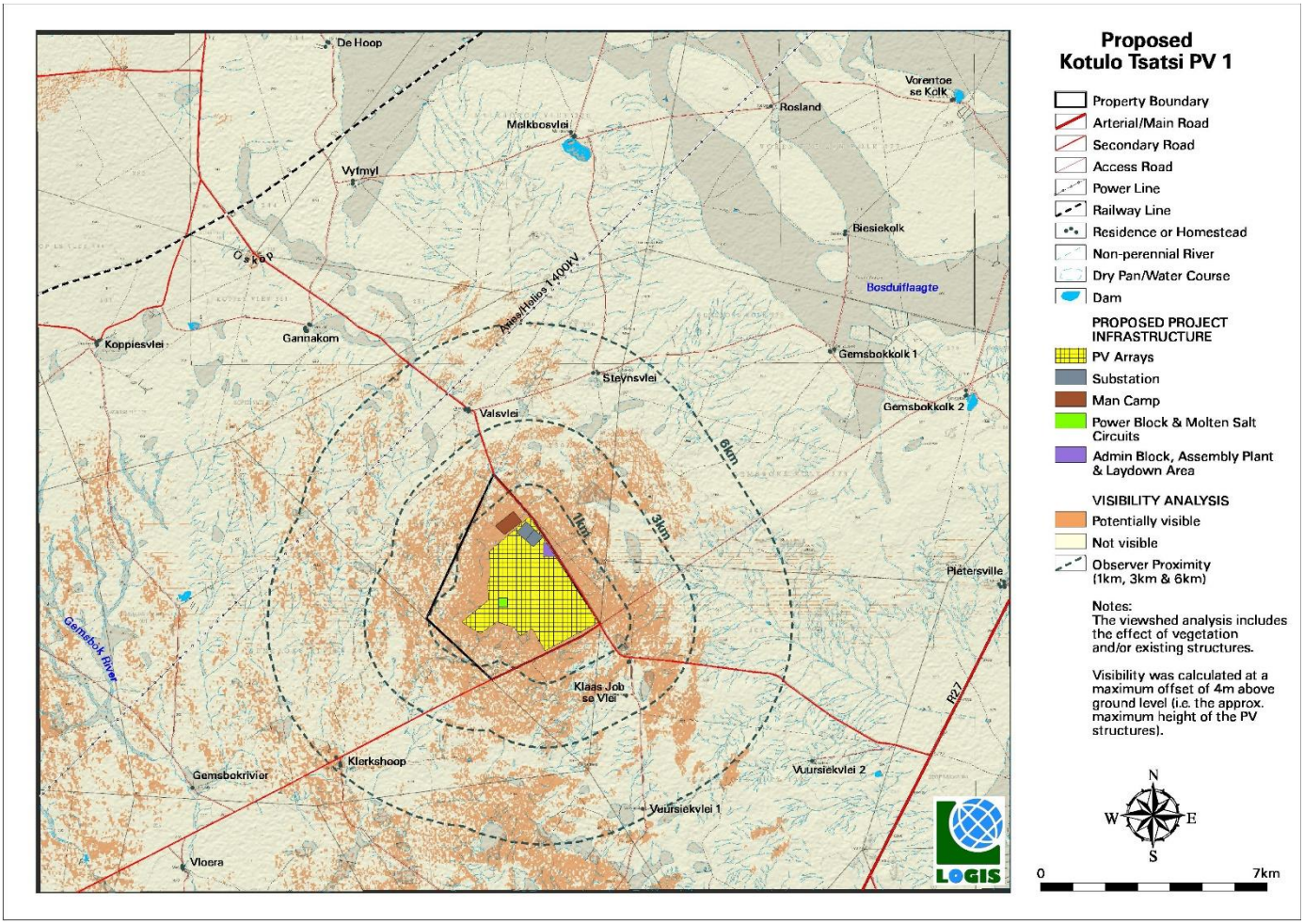

Figure 8.5: Observer proximity of the proposed Kotulo Tsatsi Energy PV1 facility

A visual impact index was generated taking into account visual exposure, viewer incidence/perception and visual distance of the proposed Kotulo Tsatsi Energy PV1 facility (refer to **Figure 8.6**). The index indicates that potentially sensitive visual receptors within a 1km radius of the power plant may experience a very high visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to high within a 1– 3km radius (where/if sensitive receptors are present) and moderate within a 3 – 6km radius (where/if sensitive receptors are present). Receptors beyond 6km are expected to have a low potential visual impact.

8.6.2 Description of Visual Impacts

Visual impacts will occur during the construction and operation phases of the PV1 facility. The following impacts are assessed in detail in section 8.6.3:

- Construction impacts
- Potential visual impact on sensitive visual receptors located within a 1km radius of the operational power plant
- Potential visual impact on observers travelling along roads located within a 1km radius of the power plant
- Lighting impacts

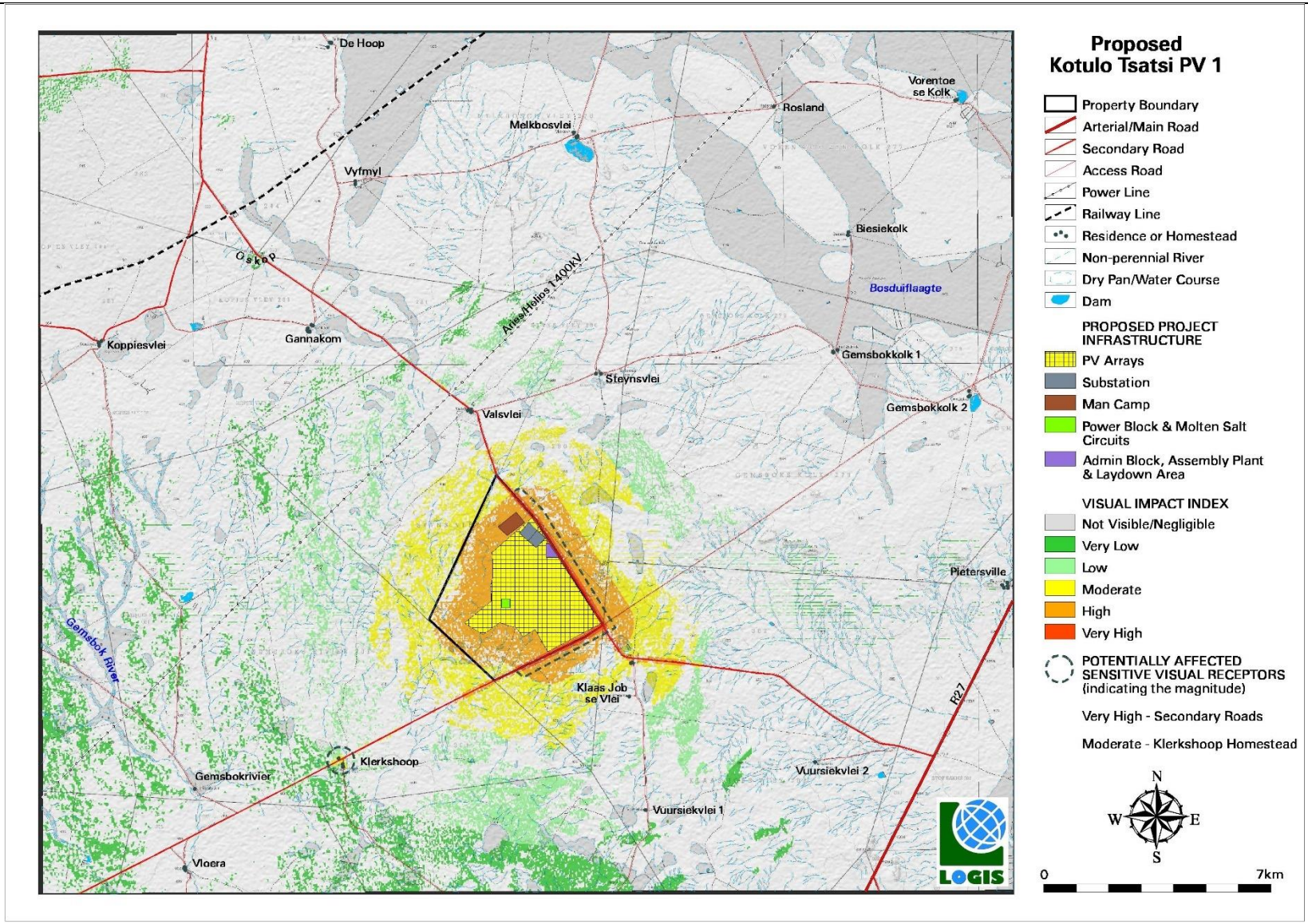

Figure 8.6: Visual impact index and potentially affected sensitive visual receptors

» Impacts associated with ancillary infrastructure
» The potential visual impact of the proposed power plant on the sense of place of the region

Due to the generally limited number of potentially sensitive visual receptors brought about by the remote location of Kotulo Tstatsi Energy PV1, it is expected that the PV facility will have moderate visual impact on observers traveling along the secondary roads, residents of homesteads and visitors to the region.

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

Nature: *Visual impact of construction activities on sensitive visual receptors in close proximity to the PV facility and ancillary infrastructure*

During construction, there may be a noticeable increase in heavy vehicles utilising the roads to the development envelope that may cause, at the very least, a visual nuisance to other road users and landowners in the area.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (40)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

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

Construction:

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

Residual:

None, provided rehabilitation works are carried out as specified.

Nature: *Potential visual impact on sensitive visual receptors located within a 1km radius of the PV facility structures.*

Visual impact on observers travelling along the roads within a 1km radius of the PV facility structures.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)

Probability	Probable (3)	Probable (3)
Significance	**Moderate (42)**	**Moderate (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

» Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.
» Consult adjacent landowners (if present) to inform them of the development and to identify any (valid) visual impact concerns.

Operation:

» Maintain the general appearance of the facility as a whole.

Decommissioning:

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

Residual:

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

Nature: *Visual impact on sensitive visual receptors within the region (1 – 6km radius)*

The operational PV facility could have a low visual impact on observers located between a 1 – 6km radius of the PV facility, both before and after the implementation of mitigation measures.

	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (26)**	**Low (26)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, however best practice measures are recommended.	

Mitigation:

Planning:

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

Operation:

» Maintain the general appearance of the site as a whole.

Decommissioning:

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

Residual:

Minimal residual impact if mitigation measures are implemented.

Nature: *Lighting impacts*

It is possible that the PV facility may contribute to the effect of sky glow within the environment which is currently undeveloped.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (42)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

Planning and operation:

» Shield the sources of light by physical barriers (walls, vegetation, or the structure itself).
» Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights.
» Make use of minimum lumen or wattage in fixtures.
» Make use of down-lighters, or shielded fixtures.
» Make use of Low Pressure Sodium lighting or other types of low impact lighting.
» Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

Residual:

The visual impact of lighting will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

Nature of Impact: *Potential visual impact of solar glint and glare as a visual distraction and possible air travel hazard*

Glint and glare occur when the sun reflects off of surfaces with specular (mirror-like) properties. The visual impact of solar glint and glare as a visual distraction and possible air travel hazard.

	Without mitigation	***With mitigation***
Extent	Local (2)	N.A.
Duration	Long term (4)	N.A.
Magnitude	Low (4)	N.A.
Probability	Improbable (2)	N.A.
Significance	**Low (20)**	N.A.
Status (positive or negative)	Negative	N.A.
Reversibility	Reversible	N.A.
Irreplaceable loss of resources?	No	N.A.
Can impacts be mitigated?	N.A.	

Mitigation:

N.A.

Residual impacts:

N.A.

Nature: *Visual impacts associated with ancillary infrastructure*

On-site ancillary infrastructure associated with the PV facility includes smaller substations (inverters), IESS, 33kV cabling between the PV arrays, meteorological measurement station, internal access roads, workshop, office buildings, etc. No dedicated viewshed analyses have been generated for the ancillary infrastructure, as the range of visual exposure will fall within that of the PV arrays. The anticipated visual impact resulting from this infrastructure is likely to be of low significance both before and after mitigation.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (20)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, only best practise measures can be implemented	

Mitigation:

Planning:

» Retain/re-establish and maintain natural vegetation immediately adjacent to the power plant.

Operation:

» Maintain the general appearance of the infrastructure.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use.

» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

Residual:

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

Nature: *Potential visual impact of the PV facility on the sense of place of the region*

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The greater environment has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development represents existing visual disturbances.

The anticipated visual impact of the proposed PV facility on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of low significance. This is due to the relatively low viewer incidence within close proximity to the proposed development site..

	Without mitigation	With mitigation
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (22)**	**Low (22)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, only best practise measures can be implemented	

Mitigation:

Planning:

» Retain/re-establish and maintain natural vegetation immediately adjacent to the power plant.

Operation:

» Maintain the general appearance of the facility as a whole.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
Residual: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.

XXX

8.6.5 Implications for Project Implementation

Overall, the significance of the visual impacts is expected to to low with the implementation of mitigation, with the exception of the visual l impact on observers travelling along the roads within a 1km radius of the PV facility structures, which is of moderate significance. This is as a result of the generally undeveloped character of the landscape and the remote location of the project infrastructure. There are a very limited number of potentially sensitive visual receptors within a 6km radius of the Kotulo Tsatsi PV1 facility, although the possibility does exist for visitors to the region to venture in to closer proximity to the solar power generating structures. These observers may consider visual exposure to this type of infrastructure to be intrusive. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the PV facility would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

8.7. Assessment of Impacts on Heritage Resources

Impacts on heritage resources may occur due to loss of archaeological and palaeontological resources during construction activities of Kotulo Tsatsi Energy PV1. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I**).

8.7.1 Results of the Heritage Impact Assessment (including archaeology and palaeontology)

Archaeology and Heritage Resources

The area proposed for the development of the PV1 facility and associated infrastructure has yielded some cultural remains but with varied value and preservation. The isolated and scattered lithic artefacts are typical of a deflated landscape and have very limited cultural value given that they have been accumulated and modified by various natural processes to their current *ex situ* state. None of the archaeological resources identified in this field assessment are considered worthy of conservation (refer to **Figure 8.7**.

In terms of the cultural landscape, no engraved rock art was identified in this assessment, despite the proximity of the development area to known rock art sites. Furthermore, the dolerite outcrops evident in the geology map located to the east do not form hills or koppies and are therefore unlikely to have been used in rain-making activities. As such, it is unlikely that the proposed development of the Kotulo Tsatsi Energy PV1 facility will negatively impact any significant archaeological heritage resources.

Palaeontology

The potentially fossiliferous Karoo Supergroup bedrocks (Dwyka and Ecca Groups) are deeply weathered and extensively calcretised near-surface in this area. Over the majority of their outcrop areas the bedrocks are mantled by various superficial deposits that may reach thicknesses of several meters and that are of low palaeontological sensitivity. Two palaeontological sites are present within the proposed development envelope assessed in this report - SAHRIS Site ID 90934 and 90935, each graded IIIC, however Almond (2015) does not recommend any mitigation in terms of impact to these resources.

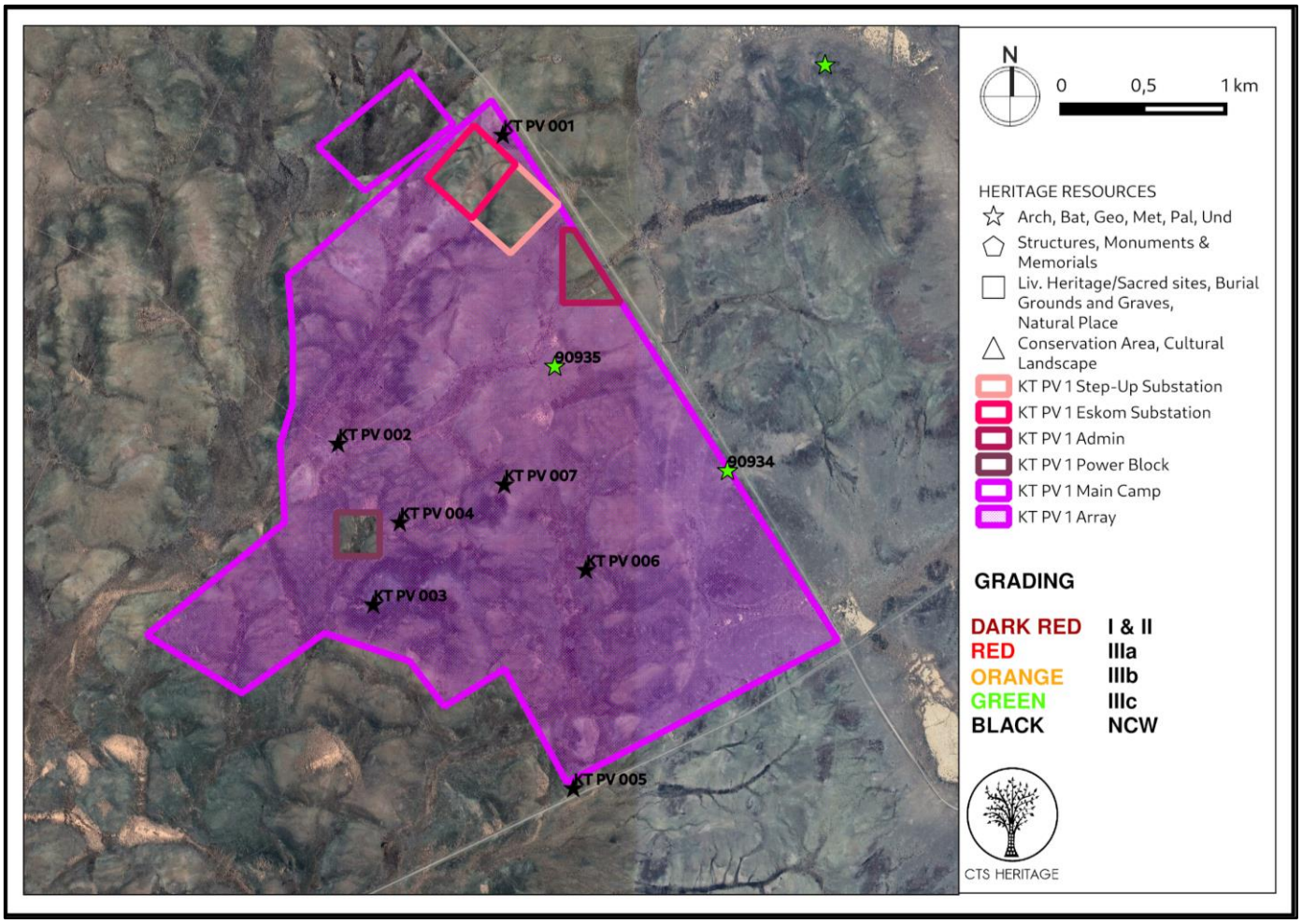

Figure 8.7: Heritage observations made during field assessment and extracted from SAHRIS

8.7.2 Description of the Heritage Impacts

Potential impacts to archaeological and palaeontological resources would occur during the construction phase only and would be in the form of direct impacts.

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

Nature: Impacts on archaeological resources due to the proposed development Direct destruction of buried archaeological materials during development of proposed facility.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (1)	Minor (1)
Probability	Improbable (1)	Improbable (1)
Significance	Low (7)	Low (7)
Status (positive or negative)	Neutral	Neutral
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: ECO monitor for impacts to archaeological resources and governed by the Chance Fossil Finds Procedure.		
Residual Impacts: Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.		

Nature: :Impact to paleontological resources Direct destruction of buried paleontological materials during development of proposed facility		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (1)	Minor (1)
Probability	Improbable (2)	Improbable (1)
Significance	Low (14)	Low (7)
Status (positive or negative)	Neutral	Neutral
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Possible	Unlikely
Can impacts be mitigated?	Yes	
Mitigation: All excavations into bedrock are monitored by the ECO and governed by the Chance Fossil Finds Procedure.		
Residual Impacts: Should any previously unrecorded paleontological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.		

8.7.5 Implications for Project Implementation

The main issue for this project will be the potential to intersect archaeological or paleontological resources during excavations. However, with appropriate mitigation, the impacts can be easily managed and are of low significance. As such, it is unlikely that the proposed development will negatively impact on significant archaeological or palaeontological heritage resources and there is no objection to the proposed development. Based on the work completed by Almond (2015) for this area, it is recommended that no

further palaeontological assessment is necessary, but that a Chance Fossil Finds Procedure be implemented for all deep bedrock excavations.

8.8. Assessment of Social Impacts

Impacts on the social environment are expected during both the construction and operation phases. Potential social impacts and the relative significance of the impacts associated with the development of PV1 are summarised below (refer to **Appendix J**).

8.8.1 Results of the Social Impact Assessment

Through the undertaking of this Social Impact Assessment for the development of PV1, the current *status quo* of the area from a social and land use perspective, as well as previous studies within the broader study area, was considered in order to provide an indication of the pre-construction environment and aid in the identification of positive and negative social impacts expected to occur. This assessment considered the following points:

» The location of the development area in relation to immediately adjacent and surrounding social features or receptors that may be affected.
» The nature, extent and significance of the features within the social landscape being considered.
» The existing disturbance already present within the social landscape (i.e. current land use activities and industrial developments).

From the telephonic interviews undertaken it is concluded that majority of the stakeholders are in support of the development, with only one landowner in the broader area objecting to the project. Positive economic and growth opportunities were identified to be associated with the project which included a benefit in terms of a change in the land use to a function which is viable for the area, where the current farming activities are severely limited and challenging. Negative impacts were also identified which were mainly related to safety and security concerns to the vulnerable community, stock theft, an influx of people and the lack of sufficient infrastructure in the area to support the influx, a change in the unique landscape and traffic impacts.

8.8.2 Description of Social Impacts

The following positive and negative impacts have been identified and assessed for the Kotulo Tsatsi Energy PV1 facility:

Positive social impacts associated with the construction phase:
» Direct and indirect employment opportunities
» Economic multiplier effects

Negative social impacts associated with the construction phase:
» 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

Positive social impacts associated with the operation phase:
» Direct and indirect employment opportunities
» Development of non-polluting renewable energy infrastructure
» Contribution to Local Economic Development (LED) and social upliftment

Negative social impacts associated with the operation:
» 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.

A workforce for the construction of the facility will be required and therefore direct employment will be generated. The two closest towns (i.e. Kenhardt and Brandvlei) have a relatively large economically active population. It is estimated that during the construction phase (for the period of 12-18 months) approximately ~200-250 employment opportunities will be generated for the PV facility. In terms of skills requirements, it is common that highly skilled or skilled labour such as engineers, technical staff and project managers will make up approximately 20% of the work force; semi-skilled staff would typically be required to operate machinery and this will constitute about 30% of employees; while unskilled staff such as construction and security workers will constitute about 50% of the work force. Employment opportunities for the proposed development will peak during the construction phase and significantly decline during the operation phase.

The project has the potential to create several job opportunities for low skilled (construction, security and maintenance workers) and semi-skilled workers, which could potentially be sourced from the surrounding towns and area. However due to the small population sizes of these towns; the number of employees required and the limited skills available at local level, the required labour may need to be sourced from outside the immediate local areas within the Hantam Local Municipality. Therefore, it could be expected that some of the workers will be sourced from region rather than only the closest towns. While the local labour pool may be qualified for less-skilled jobs, often local hiring will not meet the demands in professional, technical and supervisory areas. A number of specialist contractors would most likely be brought in from other areas.

It should be encouraged that majority of the labour be sourced from within the local pool where possible and if the relevant skills are not available then these should be sought out from surrounding local municipalities or provincial basis where possible. It is likely that an Engineering, Procurement and Construction (EPC) contractor will be appointed by the developer who will hire the necessary employees.

Another positive impact is the indirect employment opportunities that will be created. These opportunities will be experienced in the industries that provide services to the construction team where more women can be involved and employed in the process through catering and laundry services that will be needed to service the man camp and other places of accommodation. Other indirect employment opportunities that will be created during construction phase will relate to increased demand for services such as transportation, equipment rental, sanitation and waste removal.

Skills development will also be undertaken as part of the construction phase. The skills development will broaden the skills of employees associated with the project and enable possible future opportunities where these become available.

	Without enhancement	With enhancement
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (36)	Medium (44)
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 must be adopted to maximise opportunities made available to the local labour force (sourced from the nearest towns or within the affected municipal area).
- Labour must 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 Hantam LM, Namakwa DM, Northern Cape Province, South Africa, or elsewhere. Where required, training and skills development programmes must be initiated prior to the commencement of the construction phase.
- Labour force suppliers must 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, must 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.
- Enhance indirect local employment/entrepreneurship opportunities by supporting local entrepreneurs as far as possible, where appropriate.
- The recruitment selection process must seek to promote gender equality and the employment of women wherever possible.
- Proof of skills development must be provided to the upskilled individual for future opportunity.

Residual benefits/impacts:

- Improved pool of skills and experience in the local area.
- Improved overall quality of life.
- Economic growth for small-scale entrepreneurs.
- Short-term employment during the construction phase will mean that upskilled construction workers will need to seek alternative new employment opportunities following the end of the construction of the project.

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

There are likely to be opportunities for local businesses to provide services and materials for the construction phase of the development. The local service sector will also benefit from the proposed development.

On-site accommodation would be required for labourers due to the remote location of the proposed site; a man camp will be set up where basic the necessities will be provided to employees[29]. Off-site accommodation in the nearest towns (Kenhardt or Brandvlei) would also be required for contract workers and certain employees. The economic multiplier effects from the use of local goods and services opportunities will include, but is not limited to,

[29] The man camp is already authorised under the Kotulo Tsatsi CSP1 development Environmental Authorisation.

construction materials and equipment and workforce essentials such as services, catering, trade clothing, safety equipment, accommodation, transportation and other goods. There would be expenditure on the set-up of the man camp as it would require temporary/portable housing, ablution and sewage treatment, and catering facilities. In addition, it is expected that labourers who move into the area will need to purchase various consumables and personal items while living and working in the area. It is estimated that 40% of the capital expenditure will be spent locally on all other goods and services required for the development of the PV facility. It must be noted that the man camp was previously assessed within the SIA Report of the Kotulo Tsatsi Energy CSP 1 facility, and is duly authorised infrastructure.

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 (however locally sourced materials and services will be limited due to availability). There is likely to be a direct increase in industry and indirect increase in secondary businesses where gaps in the market open up.

	Without enhancement	With enhancement
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Medium (33)
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 must 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.) must be created prior to the tender process and companies listed thereon must 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 benefits/ impacts:

- Improved local service sector, growth in local business.

Nature: *Impacts from an influx of jobseekers and change in population in the study area*

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 (rise in social conflicts), 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 added pressure on basic services delivery as well as health care services. This includes municipal services

such as sanitation, electricity, water, waste management, health facilities, transportation and the availability of housing. 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.

Informal settlements may develop near towns to accommodate jobseekers. It is difficult to control the influx of people into an area, especially in a country and province where there are high levels of unemployment. It is recommended that efforts be made to source labour from the surrounding local towns first, and if availability of local labour is limited, and expand the search to the Hantam Local Municipality and other surrounding municipal areas. The local municipality population could fulfil the majority of the lower and semi-skilled employment opportunities that emerge.

	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:

- 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 prioritises "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 "locals first" procurement policy.
- Provide transportation for workers (from towns such as Kenhardt, Brandvlei and others) to ensure workers can easily access their place of employment and do not need to move closer to the 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 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 proposed site.
- Appoint a security company and implement appropriate security procedures to ensure that workers do 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.*

An increase in crime is often associated with construction activities. The perceived loss of security during the construction phase of the proposed project due to the 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 issues for neighbouring properties or damage to property, increased risk of veld fire, stock theft, poaching, and crime. The influx of labour over this period could potentially result in a security risk and conflict with residents. The establishment of the on-site accommodation for the construction phase also intensifies the presence of construction workers and thereby increases the safety and security risks. It is recommended that the project developer foster and maintain good relationships with neighbouring landowners and institute adequate grievance control mechanisms.

Majority of the impacted and adjacent farm owners utilise their farms for sheep farming, there are also minor game farming activities on nearby farms. A major concern raised by adjacent landowners is stock theft which is considered to be a problem already present within the area. The in-migration of people to the area (that will be residing in the immediate area in the man camp for 12-18 months) as well as outsiders coming into the area (contractors, construction crews and jobseekers) may increase risk posed to workers employed on the affected and adjacent properties, infrastructure on the properties, stock theft and poaching. Adjacent farm owners have expressed concern that criminal activity would increase during the construction phase which poses a potential risk to surrounding farming operations. The movement of people along the access road also increases these potential risks for farms located on the Soafskolk road. The primary access road off the R27 bisects Farm Klaas Jobs Vley 1/302.

It is recommended that the appointed EPC contractor appoints a security company and implement appropriate security procedures and measures considering the location of the project. The stakeholder engagement and management plan must also be considered with the implementation of safety and security measures.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

- » Working hours must be kept within daylight hours during the construction phase, and/or as any deviation that is approved by the relevant authorities.
- » Employees must be easily identifiable and must adhere to the security rules of the site.
- » A specific code of conduct and rules must be set-up and enforced for all employees that will be residing within the man camp. Specific fines must be set out where these rules are not complied with.
- » Provide transportation for workers (from towns such as Kenhardt and Barndvlei) where workers will not be residing within the site.
- » Enforce adherence to speed limits for all vehicles associated with the project, with fines being issued to offenders as appropriate.
- » Appropriate road signage and road rules must be implemented and enforced for all personnel.
- » Road signage must be maintained throughout the construction phase.
- » The perimeter of the construction site must be appropriately secured to prevent any unauthorised access to the site. The fencing of the site must be maintained throughout the construction and operation phases.
- » The appointed EPC contractor must appoint a security company and implement appropriate security procedures and measures.
- » Access in and out of the construction site must be strictly controlled by a security company appointed for the project.
- » No open fire are permitted outside of designated areas.
- » The EPC must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.
- » The contractor should have personnel trained in first aid on site to deal with smaller incidents that require medical attention
- » A Community Liaison Officer (CLO) must be appointed to implement a grievance mechanism. A communication protocol 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.
- » A stakeholder management plan must be implemented by the EPC contractor to address adjacent landowners and tenants concerns regarding safety and security.
- » A comprehensive employee induction programme would cover land access protocols, fire management and road safety. This must be addressed in the construction EMPr as the best practice.

Residual impacts:

- » Residual impacts related to losses through crime, stock theft and lasting damage to properties and infrastructure.

Nature: <u>Temporary increase in traffic disruptions and movement patterns during the construction phase.</u>

Project components and equipment will be transported to site using road transport which will lead to an increase in traffic due to heavy vehicles and could create short-term disruptions and safety hazards for road users. The site can be accessed via an existing gravel access road (known as Soafskolk Road) branching off of the R27 between Kenhardt and Brandvlei. Higher traffic volumes are expected to take place during the construction phase. Minor geometric layout upgrades to improve road safety and intersection functionality are required. Local farmers use the Soafskolk gravel road to access their farms. Increased use of local road systems may cause road deterioration and congestion. This impact could be magnified since farm roads are not designed to carry heavy traffic and are prone to erosion.

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 associated safety risks) and congestion. This impact could be magnified since roads of a gravel nature are not necessarily 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.

Existing infrastructure such as roads and fencing should be maintained in the present condition or repaired, if disturbed due to project-related activities, including the upgrading of roads. The contractor should be responsible for managing this impact. In terms of the use of provincial and regional roads, the developer will consult with the relevant roads agency to ensure that they obtain the relevant road permits, specifically for abnormal loads.

Where specific land use activities are being undertaken on affected properties, these may be impacted. This could impact the land use of portions of the affected property for agricultural activities (i.e. grazing), as well as affected and surrounding landowners which use their properties for mainly livestock grazing. It is understood that a property located adjacent to the Soafskolk road is not fenced and that livestock regularly cross this road. With the increase of traffic and the use of the road by heavy vehicles, the loss of livestock has been identified as a potential impact due to the lack of fencing. It is understood that the Applicant has formalised agreements with the adjacent landowner, Mr Japie du Toit, regarding the risks of use of the Soafskolk Road to his livestock and farm infrastructure, which included the specific management of risks. This agreement must be adhered to.

It is expected that the presence of the man camp will also create impacts on daily living and movement patterns for the adjacent landowners with an increase of the amount of people present within the area and also an increase in noise and movement within the area which is not characteristic of the general area.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High intensity (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	Medium (48)	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 authorities and surrounding landowners must be notified.
- All vehicles must be roadworthy 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 implemented along the R27 and gravel access roads (including the Soafskolk road) 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. Signage must be maintained throughout the construction phase.
- Consult with adjacent landowners where livestock crosses the Soafskolk road in order to come to an agreement regarding the use of the road and the management of the livestock due to the lack of fencing.
- 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.
- Communication channels between the affected and surrounding landowners and the EPC contractor must be established.

- » It is recommended that a Community Liaison Officer (CLO) be appointed to implement as the proposed grievance mechanism. 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
- » 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 Community Liaison Officer (CLO).

Residual impacts:

- » None anticipated.

Nature: Nuisance impacts in terms of temporary increase in noise and dust.

Impacts associated with construction related activities include noise, dust and disruption or damage to adjacent properties. The potential impacts can be addressed by implementing effective mitigation measures.

The movement of heavy construction vehicles and construction activities have the potential to create noise along the R27 and along the Soafskolk gravel road off the R27. The primary sources of noise during construction would be from the construction equipment movement of vehicles/ traffic. Noise levels can be audible over a large distance however are generally short in duration. Generation of dust would come from construction activities as well as trucks/ vehicles driving on the Soafskolk gravel access road. This impact will negatively impact social sensitive receptors. The impact of noise and dust on farmsteads can only be reduced through mitigation measures and not avoided. With the in-migration of people and construction workers into the area (including construction workers residing within the man camp), noise impacts will increase from current levels. The noise, dust and increased use of the local roads are expected to be negative, mainly impacting the nearby social receptors, but are short term impacts.

	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:

- » A specific code of conduct and rules must be set-up and enforced for all employees that will be residing within the man camp. Specific fines must be set out where these rules are not complied with.
- » Dust suppression measures must be implemented for heavy vehicle movement in the dry season and ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- » A speed limit of 45km/hr must be implemented on gravel roads. Should the speed limit be exceeded appropriate action must be taken against the offender of the rules.
- » Ensure all vehicles are road worthy, drivers are licensed and are made aware of the potential noise and dust issues.
- » A CLO must be appointed. A method of 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.

Residual impacts:

- » No significant residual impacts expected to occur.

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

Intrusion impacts such as aesthetic pollution, noise and light pollution will impact the "sense of place" for the local community and the surrounding landowners, specifically where land use activities sensitive to visual impacts and impacts on the "sense of place" are undertaken. The site is of a rural nature and it is expected that the development of the PV facility will impact the sense of place for the local community where visible from public access points or adjacent properties (however only to a limited extent).

As the location of Kotulo Tsatsi Energy PV1 is on a private property, within an area characterised as having a low population density the visual impact, change in landscape character and impact on the area's sense of place, from a social perspective, is anticipated to be of a low significance. However, adjacent landowners will experience a higher impact for the duration of the construction phase due to the proximity to the activities.

Construction related activities have the potential to negatively impact a local area's "sense of place", as well as the landscape character. Such an impact is likely to be present during the construction phase. It is expected that the project will mostly affect areas and receptors directly adjacent to the affected property, including road users utilising the Soafskolk Road. Other infrastructure present within the area to the west of the affected property which presents a current impact includes the Aries-Helios 1 400kV power line, the Aries 400kV substation and the Sishen-Saldanha railway line.

The identification of the significance of the impact on sense of place for the construction phase was undertaken through the consideration of the Visual Impact Assessment (LOGIS, 2021) undertaken for the project. The visual impact is expected to be of a low significance from a visual perspective due to the relatively low viewer incidence in close proximity to the project. The Visual Impact Assessment has informed the visual impact from a social perspective.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (21)
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.
- Limit night-time lighting impacts to surrounding areas.
- Communication, complaints and grievance channels must be implemented and contact details of the CLO must be provided to the local community (including the adjacent landowners) in the study area.
- 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 for the country and local economy.

The operation phase of the project will require a workforce and therefore direct employment will be generated. Although the exact number of construction workers is not confirmed at this stage, it is estimated that approximately

~35-40 jobs will be generated for the lifetime of the project (approximately 20 – 25 years). Highly skilled employees are required for the proposed project and local experts will be employed and upskilled where available.

Employment opportunities during operation and maintenance (O&M) would include skilled engineers, specialising in both electrical and mechanical engineering. Employees that can be sourced from the local municipal pool include the less skilled such as safety and security staff and maintenance crew. Maintenance will be carried out throughout the lifespan of the project and associated infrastructure.

Typical activities during maintenance include washing of solar panels, vegetation control and maintenance around the project and along the linear infrastructure (as assessed within the CSP 1 EIA process). Employment opportunities will be created during the operation phase and this is rated as positive impact although limited. On-the-job training is a key element of staff development and many of the required skills during the operation phase will be taught to the staff through day-to-day operations. This is crucial to long-term development of skills and education in the area. This will accelerate the positive benefits and impacts of the development on the economy.

	Without enhancement	With enhancement
Extent	Local-regional (3)	Local-regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Minor (1)
Probability	Highly probable(4)	Highly probable (4)
Significance	Low (28)	Medium (32)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhance)	

Enhancement:

» A local employment policy must be adopted to maximise the opportunities made available to the local community.
» The recruitment selection process must seek to promote gender equality and the employment of women wherever possible.
» Vocational training programs must be established to promote the development of skills of the employees, where possible.
» Proof of skills development must be provided to the upskilled individuals.

Residual impacts:

» Improved pool of skills and experience in the local area.

Nature: Development of non-polluting, renewable energy infrastructure.

South Africa currently relies predominantly on coal-generated electricity and as a result, the country's carbon emissions are considerably higher than those of most developing countries. The use of solar technology for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions during its operation. The generation of renewable energy (RE) utilising solar power will contribute positively to South Africa's electricity market. Given South Africa's reliance on Eskom as a power utility, the benefits associated with provision of electricity by an IPP are regarded as an important contribution, and the advancement of RE has been identified as a priority for South Africa.

Increasing the contribution of the RE sector to the local economy would contribute to the diversification of the local economy and provide greater economic stability. The growth in the RE sector as a whole could introduce new skills and development into the area. This is especially true with regards to solar power specifically considering the number of other solar power projects proposed within the broader area.

The development of RE projects have the potential to contribute to the stability of the economy, and could contribute to the local economy through employment generation (direct, indirect, and local service providers) and revenue generation for the LM. While the overall contribution of the project to South Africa's total energy requirements is small, the facility will also contribute towards offsetting the total carbon emissions associated with energy generation in South Africa. It should however be noted that such a benefit is associated with all RE projects and not only solar power projects in particular.

	Without enhancement	With enhancement
Extent	Local- Regional- National (4)	N/A
Duration	Long term (4)	N/A
Magnitude	Minor (2)	N/A
Probability	Highly probable (4)	N/A
Significance	Medium (40)	N/A
Status (positive or negative)	Positive	N/A
Reversibility	Yes	
Irreplaceable loss of resources?	Yes (impact of climate change)	
Can impacts be mitigated?	No	

Mitigation/Enhancement:

» None required/anticipated.

Residual impacts:

» Reduce carbon emissions through the use of renewable energy and contribute to reducing global warming.

Nature: Contribution to local economic development and social upliftment during the operation of the project.

Projects which forms part of the DMRE's REIPPP Programme are required as part of their bidding requirements to contribute towards LED and social upliftment initiatives within the area in which they are proposed. In addition, they are required to spend a percentage of their revenue on socio-economic and enterprise development, as well as allocate ownership shares to local communities that benefit previously disadvantaged communities around the project. A portion of the dividends generated by each development also need to be invested into LED projects and programmes. Kotulo Tsatsi Energy PV1 therefore has the potential to contribute positively towards socio-economic development and improvements within the local area.

Socio-economic spin-offs from the project could contribute towards upliftment of the surrounding communities. An in-depth Community Needs Assessment (CNA) is required to ensure that the beneficiary community's needs are understood and sufficiently addressed by the proposed development programmes in order to contribute meaningfully towards local economic growth and development.

	Without enhancement	With enhancement
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Highly probable (4)	Definite (5)
Significance	Medium (44)	High (65)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhance)	

Enhancement:

- A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful in terms of the local communities and the current situation.
- Ongoing communication and reporting is required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes being misused.
- The programmes must be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).

Residual impacts:

- Social upliftment of the local communities through the development and operation of the project.

Nature: Visual impacts and sense of place impacts associated with the operation phase of Kotulo Tsatsi Energy PV1.

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.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The social impacts associated with the impact on sense of place relate to the change in the landscape character and visual impact of Kotulo Tsatsi Energy PV1. As the location of the project on a private property, within an area characterised as having a low population density and being of a natural state, the visual impact and impact on the area's sense of place associated with the operation of Kotulo Tsatsi Energy PV1 is anticipated to be of a medium significance from a social perspective, which can be mitigated to a low significance. The alteration of the sense of place in view of the local residents (specifically adjacent landowners located within a 6km radius of the project) and road users will start during the construction phase and remain for the project's operational lifetime. Other infrastructure present within the area to the west of the affected property, which presents a current impact, includes the Aries-Helios 1 400kV power line, the Aries 400kV substation and the Sishen-Saldanha railway line.

The identification of the significance of the impact on sense of place for the operation phase was undertaken through the consideration of the Visual Impact Assessment (LOGIS, 2021) undertaken for the project. The visual impact is expected to be of a low significance from a visual perspective due to the relatively low viewer incidence in close proximity to the project. The Visual Impact Assessment has informed the visual impact from a social perspective.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

- Maintain and manage the facility to be in a good and neat condition to ensure that no degradation of the area and site takes place and impacts 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 and landscape character.
Residual impacts: » The visual impact of Kotulo Tsatsi Energy PV1 will remain until the infrastructure is completely decommissioned and removed. Thereafter the impact will be removed.

Nature: Loss of area for agricultural activities and overall productivity as a result of the operation of the project on a property used for livestock grazing.

The affected property where Kotulo Tsatsi Energy PV1 is located in an area with an arid climate which consists of shallow soils that limits the agricultural potential to low intensity grazing. Therefore, from a soils and agricultural potential the impact on agricultural resources is considered to be minimal.

The arid climate and associated low rainfall in the area means that there is little potential for rain-fed arable agriculture in the area. The broader area is currently used for livestock grazing, however arid climate of the area coupled with shallow soils limits the agricultural potential to low intensity grazing.

Considering the limitations of the site from an agricultural resource perspective, the significance of the impact on the loss of land for continued agricultural practises will be low from a social perspective.

The Agricultural Compliance Statement (The Biodiversity Company, 2020) was considered for the identification of the significance relating to the impact on loss of agricultural land.

It must be noted that the affected landowner, considers the shadow of the panels and washing of panels as an opportunity for vegetation growth which will assist with future grazing activities during operation. This positive contribution will however be limited.

	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Small (0)
Probability	Probable(3)	Improbable(2)
Significance	Low (21)	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 appropriate erosion measures.
» Implement mitigation measures recommended by the soils specialist.

Residual impacts:
» None expected to occur.

Decommissioning Phase

Major social impacts associated with the decommissioning phase are typically linked to the loss of jobs and associated income and will be similar to the impacts during the construction phase. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. The impact will be of a local extent, short duration, minor magnitude and is considered to be

probable. The significance of the impact will be low. For Kotulo Tsatsi Energy PV1 it is anticipated that the facility will be refurbished and upgraded to prolong its lifespan, where possible and decommissioning will only take place once the economic viability of the project has come to an end.

8.6.5 Implications for Project Implementation

The social impacts identified will be either of a low, medium or high significance, depending on the impact. No negative impacts with a high significance rating have been identified to be associated with the development of Kotulo Tsastsi Energy PV1. Only positive social impacts are considered to be of a high significance. All negative social impacts are within acceptable limits (medium or low significance depending on the impact being considered with no impacts considered as unacceptable from a social perspective. The recommendations proposed for the project are considered to be appropriate and suitable for the mitigation of the negative impacts and the enhancement of the positive impacts.

8.9. Risks Associated with the Integrated Energy Storage System

An Integrated Energy Storage Systems (IESS) comprising an electrochemical battery system will allow for energy storage for an extended period (of up to 4 hours). The general purpose and utilisation of the IESS will be to save and store excess electrical output from the facility as it is generated, allowing for a timed release to the national grid when the capacity is required. The IESS will be contained within insulated containers integrated as part of the PV array and will connect to the on-site facility substation via underground cabling which will follow the internal access roads of the facility. **Figure 8.8 p**rovides a general illustration of a IESS.

Figure 8.8 Example of battery storage units integrated as part of PV array (Source: nexttracker.com)

The risks associated with battery technologies are generally well understood and researched. The primary risks relate to fire hazards and the potential for a condition known as 'thermal runaway'. Thermal runaway occurs in situations where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result. The risks detailed in the table below considers only the risks associated with on-site use of battery energy storage systems for PV facilities.

Possible risks associated with the construction and operation of the IESS from a technical perspective within the development footprint of Kotulo Tsatsi Energy PV1 facility are limited to health and safety aspects during the project life cycle of the IESS as well as the solar energy facility. The risks identified for the construction and operation of the IESS are detailed below. Mitigation measures have been included within the project EMPr (**refer to Appendix L**).

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
1. Mechanical breakdown/ Exposure to high temperatures » Incidents where the batteries are broken or exposed to temperature above room temperature could lead to overheating as well as fires which can affect infrastructure components of the IESS. » Leakages of substances contained within the battery cells (should they not be assembled off-site).	Low	» Fires, electrocutions and spillage of toxic substances into the surrounding environment. » Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. » Water Pollution – spillages into surrounding watercourses as well as groundwater. » Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.	Operators are trained and competent to operate the IESS. Training should include the discussion of the following: * Potential impact of electrolyte spills on groundwater; * Suitable disposal of waste and effluent; * Key measures in the EMPr relevant to worker's activities; * How incidents and suggestions for improvement can be reported. » Training records should be kept on file and be made available during audits. » Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. » Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. » Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). » Firefighting equipment should readily be available at the IESS area and within the site. » Maintain strict access control to the IESS area. » Ensure all maintenance contractors / staff are familiar with the supplier's specifications. » Undertake daily risk assessment prior to the commencement of daily tasks at the IESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these. » Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. » Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. » The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the IESS should only be limited to the placement of the container wherein the batteries are placed.

Nature of Risk	*Likelihood*	*Impact*	*Mitigation / Management of Risk*
			» Undertake periodic inspections on the IESS to ensure issues are identified timeously and addressed with the supplier where relevant. » The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the IESS. » Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the IESS.
2. <u>Generation of hazardous waste</u> » The incorrect disposal of the batteries and the associated components could have an adverse impact on the environment.	Medium	» Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from the disposed batteries into the soil, which could lead to an impact of the productivity of soil forms in affected areas. » Water pollution – leachate from the disposed batteries spilling into surrounding watercourses as well as groundwater. » Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.	» Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. » The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.

8.10. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing Kotulo Tsatsi Energy PV1 facility. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities of the Kotulo Tsatsi Energy PV1 facility.

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.

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 from solar energy 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-economics

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.

c) Regional scale impacts

Should the no-go option be considered and implemented, the status quo pertaining to the requirement for additional capacity in the region will remain, as a result, the benefits associated with the introduction of renewable energy would not be realised. The Northern Cape has an ample solar resource and Kotulo Tsatsi Energy PV1 is only proposed to contribute a contracted capacity of up to 200MW, which would assist in meeting the electricity demand throughout the country and would also assist in meeting the government's goal for renewable energy and the energy mix. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

- Increased energy security;
- Resource saving (i.e. fossil fuels and water);
- Exploitation of South Africa's significant renewable energy resource;
- Pollution reduction;
- Climate friendly development;
- Support for international agreements;
- Employment creation;
- Acceptability to society; and
- Support to a new industry sector.

Costs and Benefits associated with the Kotulo Tsatsi Energy PV1 Facility

Overall, the implementation of the Kotulo Tsatsi Energy PV1 facility at the proposed site is expected to result in a number of social and environmental costs and benefits.

Environmental costs identified for the project include:

- Direct loss of biodiversity, flora, fauna, and avifauna due to the clearing of land for the construction and utilisation of land for the project (which is limited to the development footprint). This impact is minimised through the placement of the Kotulo Tsatsi Energy PV1 facility within the already authorised footprint of the CSP 1 development area.
- Impact to major drainage features as a result of the development of the PV1 facility. Direct and indirect impact to drainage features can be avoided by implementation of specialist mitigation measures (demarcation of no-go and buffer areas etc.)
- Visual impacts associated with the project. The location of the facility within an area characterised by vast space and vegetation and other energy development mitigates the visual impact of the facility to a large extent.

The positive implications of establishing the project on the demarcated site include:

- The project will result in important socio-economic benefits at the local and regional scale through job creation, procurement of materials and provision of services and other associated downstream economic development. These will persist during the pre-construction, construction and operation phases of development.
- The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy development.
- The development will supplement and stabilise the landowner's income in an area where farming is susceptible to prolonged droughts.

The costs associated with the project are anticipated to occur at a site specific level, the significance of which can be largely reduced through the application of appropriate mitigation measures, and through the appropriate placement of infrastructure within areas of lower sensitivity identified on site. Due to the fact that the benefits of the project are expected to occur at a larger scale (i.e. national, regional and local level), the expected benefits of the project are expected to partially offset the localised environmental costs of the project.

Impacts of the Do Nothing Alternative

The following impacts are anticipated with the implementation of the "Do Nothing" option:

- Failure to provide power generation capacity from clean, renewable energy in accordance with the Department of Energy's (DoE's) National Integrated Resource Plan (IRP).
- Failure to allow for an appropriate change in solar generation technology on the site, that is technology change from the previously authorised CSP project infrastructure to PV project infrastructure.

- Failure to contribute to 200MW to energy generation mix to the national electricity grid (should the project be selected as Preferred Bidder), which in turn has the opportunity to stimulate economic growth and development
- Failure to realise the potential local economic development and social upliftment benefits associated with the implementation of project.

Conclusion

Although a number of impacts of potential moderate significance have been identified, no environmental fatal flaws were identified to be associated with the Kotulo Tsatsi PV1 facility through the specialist studies undertaken. Where impacts cannot be avoided, appropriate mitigation has been identified to minimise impacts to acceptable levels. A number of negative impacts have been identified to be associated with the implementation of the do nothing alternative.

The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of the Kotulo Tsatsi Energy PV1 facility.

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CHAPTER 9. ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 8, the Kotulo Tsatsi Energy PV1 facility may have effects (positive and negative) on natural resources, the social environment and on the people living in the project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with the project largely in isolation (from other similar developments).

The REIPPP Programme has been rolled out in bid windows (rounds) since 2011, in which developers submit planned renewable energy projects for evaluation and selection. The bid selection process considers a number of qualification and evaluation criteria. The proposed tariff, as well as socio-economic development contributions by the project and the bidder are the main basis for selection after the qualification criteria have been met.

As a result of the REIPPP Programme, there has been a substantial increase in interest in PV facility developments in South Africa (largely in the Northern Cape and North West Provinces), with a number of PV facilities selected as Preferred Bidder projects and 82 PV facilities currently operational (Energyblog, 2021). It is, therefore, important to follow a precautionary approach in accordance with NEMA to ensure that the potential for cumulative impacts are considered and avoided where possible.

This chapter assesses the potential for the impacts associated with the project to become more significant when considered in combination with other large-scale solar power generation developments in the area.

9.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Environmental Impact Assessment Report

This chapter of the EIA report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Content of EIA Report:

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 Klip Punt PV1 are included and assessed within this chapter.

9.1 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the Kotulo Tsatsi Energy PV1 facility and its associated infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to test if such impacts are relevant to the Kotulo Tsatsi PV1 facility within the project site being considered for the development:

- Unacceptable loss of habitat or landscape connectivity through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning;
- Unacceptable risk to avifauna through loss of avifaunal habitats;
- Unacceptable risk to aquatic resources through disturbance associated with construction activities and increased runoff and erosion during the operation phase;

- Unacceptable loss of high agricultural potential areas presenting a risk to current land use activities 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.
- Unacceptable impact to socio-economic 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 PV facility developments throughout South Africa, while the significance of the cumulative impact on visual amenity may only be influenced by PV facility developments that are in closer proximity to each other. For practical purposes, a sub-regional scale of 30km has been selected for this cumulative impact evaluation. The potential for cumulative impacts is summarised in the sections which follow and has been considered within respective specialist studies in varying degrees (refer to **Appendices D – J**).

Figure 9.1 indicates the location of the Kotulo Tsatsi Energy PV1 facility in relation to all known and viable solar power generation developments located within a radius of 30km from the project site, including both solar PV and Concentrated Solar Power (CSP) facilities. These developments were identified using information available in the public domain at the time of this assessment. The closest authorised facilities to the site include:

Table 9.1: Solar Technology developments within 30km radius of Kotulo Tsatsi Energy PV1

Project Name	DFFE Reference Number	Status
Kotulo Tsatsi Energy CSP2	14/12/16/3/3/2/694/2	Authorised
Kotulo Tsatsi Energy CSP3	14/12/16/3/3/2/694	Authorised
Kotulo Tsatsi Energy PV2	14/12/16/3/3/2/696	Authorised
Aries Solar PV		Authorised

It should be noted that not all the solar facilities 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 (DFFE, DOE, NERSA) due to the following reasons:

- There may be limitations to the capacity of the existing or future Eskom grid;
- Not all applications will receive a positive environmental authorisation;
- There are stringent requirements to be met by applicants in terms of the REIPPP Programme and a highly competitive process that only selects the most competitive projects;
- Not all proposed PV facilities will be able to reduce the associated negative impacts to acceptable levels or be able to mitigate the impacts to acceptable levels (fatally flawed);
- Not all proposed facilities will eventually be granted a generation license by NERSA and sign a Power Purchase Agreement with Eskom; and
- Not all developers will be successful in securing financial support to advance their projects further.

The cumulative impacts of other known solar facilities (PV and CSP) in the surrounding area and Kotulo Tsatsi Energy PV1 are qualitatively assessed in this chapter. The following potential impacts are considered:

- Cumulative impacts on ecological processes (including fauna and flora)
- Cumulative impacts on avifauna
- Cumulative impacts on freshwater resources
- Cumulative impacts on heritage resources (including archaeology and palaeontology)
- Cumulative visual impacts
- Cumulative social impacts

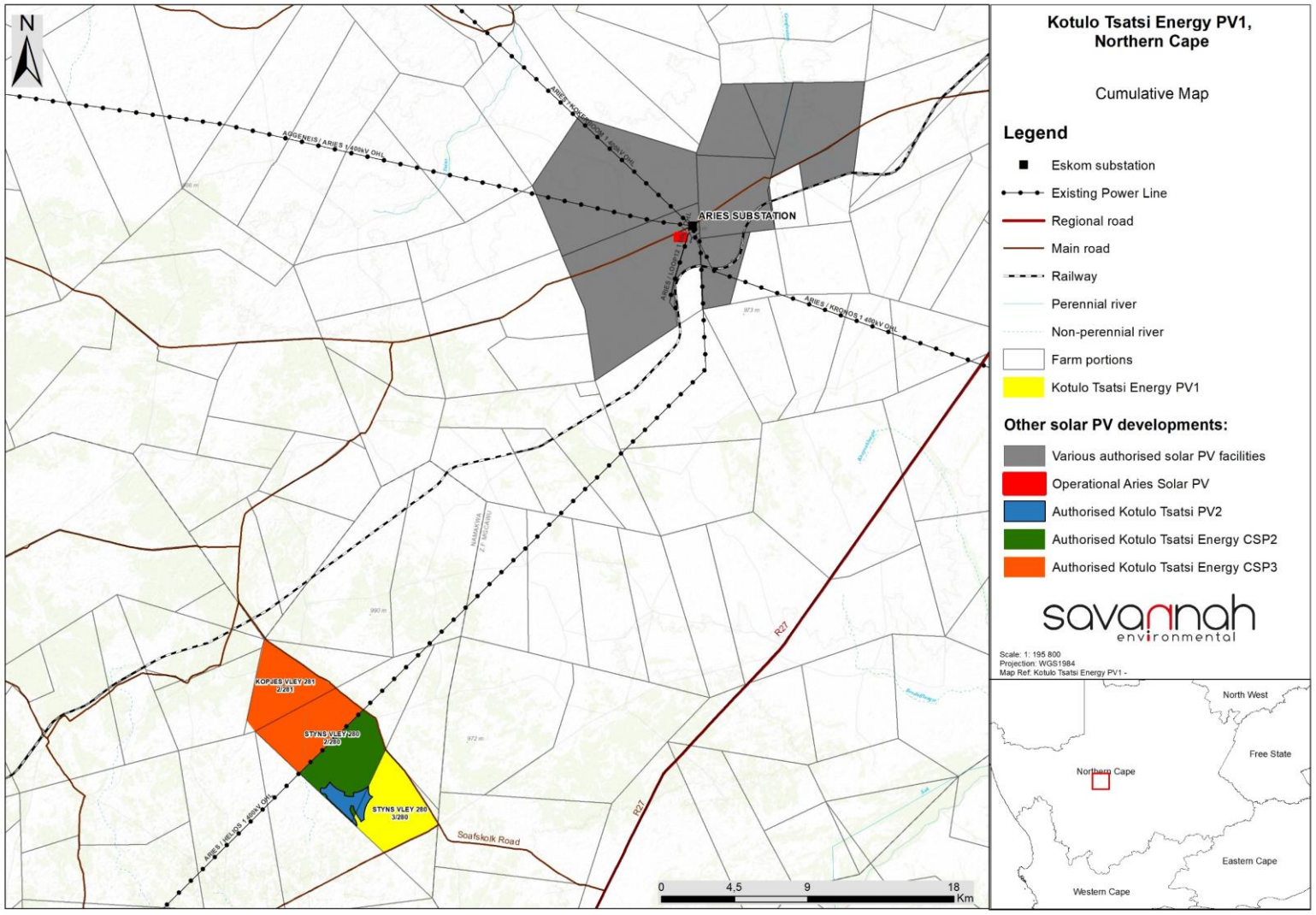

Figure 9.1: Cumulative map indicting the location of other solar energy developments within 30km of the Kotulo Tsatsi Energy PV1 site

9.2 Cumulative Impact on Ecological processes (including fauna and flora)

Cumulative ecological impacts have been identified for the Kotulo Tsatsi Energy PV1 (refer to **Appendix D**). Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. Due to the presence of a number of other renewable energy developments in the area, this is a potential cumulative impact of the development that is assessed. The site falls outside of any CBAs, ESAs and NC-PAES focus areas with the result that impacts on CBAs and the ability to meet future conservation targets would be minimal. Although there are several other planned renewable energy developments in the area, cumulative impacts are low and considered acceptable.

Nature: *Cumulative impacts impact on broad-scale ecological processes*

Development of the Kotulo Tsatsi PV1 facility may impact on broad-scale ecological processes such as the ability of fauna to disperse. This is assessed in context of the extent of the current site, other developments in the area as well as general habitat loss and transformation resulting from mining, agriculture and other activities in the 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 (3)	Moderate (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Only partly as a significant proportion of the impact results from the presence and operation of the facility which cannot be well mitigated.	

Mitigation:

- Ensure that the mitigation hierarchy is applied with a particular emphasis on reducing the development footprint, rehabilitating disturbed areas and minimising degradation around the site.
- An open space management plan must be developed for the site, which should include management of biodiversity within the affected areas, as well as that in the adjacent areas around the facility under the control of the developer.

9.3 Cumulative Impact on Avifauna

From an avifauna perspective, the cumulative impacts associated with the proposed development area, including all solar technologies (PV and CSP) within a 30km radius, is of high significance, with the contribution of the Kotulo Tsatsi PV1 being low.

Nature: *Cumulative impact to avifauna for all renewable energy facilities within 30km of Kotulo Tsatsi PV1*

The impact of the PV developments is relatively benign resulting in mortality of only 2.0 + 1.3 birds per MW per year (and no red data birds), whereas the other solar technologies results in an average mortality of 6.5 birds per MW per year (including red data species). Fewer direct risks are associated with the proposed PV technology of from an avian perspective vs other solar technology. Therefore, PV developments do not add the significance of cumulative impacts.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	High (8)
Probability	Likely (3)	Probable (4)
Significance	**Low (24)**	**High (60)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Unlikely	Moderate
Can impacts be mitigated?	As a result of the other authorised solar technologies there are no effective mitigation measures	

Mitigation:

Reducing avian impacts at other solar technology or PV facilities include:

- » avoiding all migration routes and major flyways in the placement of such facilities;
- » avoid areas where accumulations of red data species occur;
- » at the proposed Kotulo Tsatsi PV1 site mitigate appropriately with PV panels placed slightly apart ;
- » to avoid collisions with heliostat mirrors, do not place them vertically but place them at an angle;
- » no known effective mitigations for CSP towers in operation, but test audible or visual deterrence to deter birds from approaching close to the CSP tower;
- » employ radar or video detection of collision-prone birds to monitor the proximity of birds to dissuade them;

9.4 Cumulative Impact on Freshwater resources

Cumulative impacts on freshwater resources have been identified for Kotulo Tsatsi Energy PV1 (refer to **Appendix F**). Cumulative impacts include downstream alteration of hydrological regimes due to increased run off, and downstream erosion and sedimentation. Cumulative impacts associated with Kotulo Tsatsi Energy PV1 are, however, of low significance.

Nature: *Compromise ecological processes as well as ecological functioning of important freshwater resource habitats*

Transformation of intact freshwater resource habitat could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to habitat fragmentation and potentially disruption of habitat connectivity and furthermore impair their ability to respond to environmental fluctuations. This is especially of relevance for larger watercourses and wetlands serving as important groundwater recharge and floodwater attenuation zones, important microhabitats for various organisms and important corridor zones for faunal movement

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local / downstream (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (3)	Moderate (5)
Probability	Improbable (2)	Probable (2)
Significance	**Low (16)**	**Low (26)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate to Low	Moderate to Low
Irreplaceable loss of resources?	No	Limited loss of local resources

Can impacts be mitigated?	Yes

Mitigation:

- All highly sensitive major ephemeral washes and their associated buffer areas must be regarded as No-Go areas for all construction activities apart from road construction/upgrading and lying of cables, and only where the use of existing access roads is not an option.
- The recommended buffer areas between the delineated freshwater resource features and proposed project activities must be maintained.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
- The potential stormwater impacts of the proposed developments areas must be mitigated on-site to address any erosion or water quality impacts.
- Good housekeeping measures as stipulated in the EMPr for the project must be in place where construction activities take place to prevent contamination of any freshwater features.
- Where possible, infrastructure must coincide with existing infrastructure or areas of disturbance (such as existing roads).
- Disturbed areas must be rehabilitated through reshaping of the surface to resemble that prior to the disturbance and vegetated with suitable local indigenous vegetation.

9.5 Cumulative impacts on Heritage Resources (including archaeology and palaeontology)

Cumulative impacts on heritage resources have been identified for Kotulo Tsatsi Energy PV1 (refer to **Appendix H**). There is the potential for the cumulative impact of proposed solar energy facilities to negatively impact the cultural landscape due to a change in the landscape character from rural agriculture to semi-industrial, however, due to the limited nature of the development the impact on the experience of the cultural landscape is not foreseen to be significant.

The cumulative heritage impacts will be low due to the remote character of the landscape within which Kotulo Tsatsi Energy PV1 is proposed to be developed.

Nature: *Cumulative impact to the cultural sense of place*.
The addition of multiple solar PV facilities and related infrastructure can result in widespread destruction of heritage resources and increased visual clutter in the natural and cultural landscape.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	Medium term (3)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**16 (Low)**	**Low (27)**
Status (positive/negative)	Neutral	Neutral
Reversibility	High	Low
Loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	N/A	

Mitigation:
No mitigation is required

9.6 Cumulative Social impacts

Considering the concentration of solar energy developments within the area directly surrounding Kotulo Tsatsi Energy PV1, the potential for some cumulative impacts to occur is likely (refer to **Appendix J**).

Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as an influx of jobseekers and change in the areas sense of place.

Nature: Cumulative impacts of employment opportunities, business opportunities and skills development

An increase in employment opportunities, skills development and business opportunities with the establishment of more than one solar power facility.

The Kotulo Tsatsi Energy PV1 and the establishment of other solar energy facilities has the potential to result in significant positive cumulative impacts; specifically with the creation of a number of socio-economic opportunities for the Province, which in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. Benefits to the local, regional and national economy through employment and procurement of services could be substantial should many renewable energy facilities proceed. This benefit will increase significantly should critical mass be reached that allows local companies to develop the necessary skills to support construction and maintenance activities and that allows for components of the renewable energy facilities to be manufactured in South Africa.

Furthermore, at municipal level, the cumulative impact could be positive and could incentivise operation and maintenance companies to centralise and expand their activities towards education and training and more closely to the projects. The type of employment will most likely change significantly due to the skilled nature of the jobs associated with solar energy projects. Cumulative impacts on local entrepreneurs will be positive and assist in developing their businesses further. The cumulative impacts of are likely to have significant positive impact on the local economy.

	Overall impact/benefit of the proposed project considered in isolation	Cumulative impact/benefit of the project and other projects in the area
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (2)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Definite (5)
Significance	Medium (44)	High (65)
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 a number of solar power projects in the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development, business opportunities and SED, where these opportunities are localised. 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: Cumulative impacts of employment opportunities, business opportunities and skills development

Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.

While the development of a single solar power project 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. Further potential impact related to in-migration of people into the area includes additional pressure on municipal services and housing, however this impact will need to be addressed in the municipal IDP process and considerations.

As one PV facility and two other CSP facilities are authorised adjacent to Kotulo Tsatsi Energy PV1, this implies that the surrounding area is likely to be subject to future development. 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 proponents 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 (1)	Local-Regional (3)
Duration	Short-term (2)	Long-term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Medium (39)
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.

Nature: Cumulative impact with large-scale in-migration of people

Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.

While the development of a single solar power project 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. Further potential impact related to in-migration of people into the area includes additional pressure on municipal services and housing, however this impact will need to be addressed in the municipal IDP process and considerations.

As one PV facility and two other CSP facilities are authorised adjacent to Kotulo Tsatsi Energy PV1, this implies that the surrounding area is likely to be subject to future development. 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 proponents 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 (1)	Local-Regional (3)
Duration	Short-term (2)	Long-term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Medium (39)
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.

Nature: <u>Visual impact and impact on the sense of place and landscape character</u>

The social impacts associated with the impact on sense of place relate to the change in the landscape character and visual impact of Kotulo Tsatsi Energy PV1. Given the location of the project on a private property, within an area characterised as having a low population density and being of a natural state, the visual impact and impact on the area's sense of place associated with the operation of Kotulo Tsatsi Energy PV1 is anticipated to be of a low significance. The alteration of the sense of place in view of the local residents (specifically adjacent landowners) and road users will start during the construction phase and remain for the project's operational lifetime. The area

has not been previously exposed to large scale industrial development, except for linear infrastructure such as the Aries-Helios 1 400kV power line and the Sishen Saldanha railway line.

The development of various PV facilities within the area will increase the extent of industrial infrastructure and result in a medium significance.

The identification of the significance of the cumulative impact on sense of place was undertaken through the consideration of the Visual Impact Assessment (LOGIS, 2021) undertaken for the project. The Visual Impact Assessment identified that the impact on sense of place will be of a low significance.

	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 (4)	Low (5)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Medium (30)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, only best practice measures can be implemented	
Confidence in findings	High	

Mitigation:

» Maintain and manage the facilities to be in a good and neat condition to ensure that no degradation of the area and sites takes place and impacts the visual quality of the area.
» Implement the relevant mitigation measures as recommended in the Visual Impact Assessment.

Residual impacts

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

9.7 Cumulative Visual impacts

Cumulative visual impacts to landscape change, have been identified for Kotulo Tsatsi Energy PV1 (refer to **Appendix J**). The construction of all of the renewable energy facilities in the area is expected to increase the cumulative visual impact of industrial type infrastructure within the region.

The study area may ultimately encompass four solar energy facilities, namely the proposed Kotulo Tsatsi Energy PV1, and the authorised PV2, CSP2 and CSP3 facilities.

The combined area of visual exposure will be significantly smaller than the expansive visual exposure of the heliostats and CSP towers. The area of highest cumulative exposure i.e. where both PV and CSP infrastructure would be visible, is predominantly located to the south of the development site. It is however expected that the CSP structures would be much more prominent than the PV structures, due to their considerably larger dimensions. The PV infrastructure will in all likelihood be dwarfed by the CSP infrastructure and will be much less conspicuous than the latter.

Cumulative visual exposure will furthermore, occur at varying distances from the respective facilities, with some structures appearing in the foreground, and others further away in the distance. It is also possible

that structures from one of the solar energy facilities closer to the observer may obstruct views of structures located further away, thereby negating the potential cumulative visual impact.

Locating the proposed PV2 plant in closer proximity to the authorised solar plants will largely help to prevent the scattered proliferation of solar energy generation infrastructure throughout the greater region. The expected cumulative impact significance of the development is of medium significance.

Nature: *The potential cumulative visual impact of the solar energy facilities on the visual quality of the landscape.*

It is preferable to concentrate future solar energy infrastructure within this area, considering the fact that the Kotulo Tsatsi Energy PV2, and CSP2 and CSP3 facilities have already been authorised. Locating the proposed PV2 plant in closer proximity to the authorised solar plants will largely help to prevent the scattered proliferation of solar energy generation infrastructure throughout the greater region.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	High (8)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Medium (45)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Mitigation:

Planning:

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

Operations:

» Maintain the general appearance of the facility as a whole.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use.

» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

9.8 Conclusions regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development Kotulo Tsatsi Energy PV1 throughout all phases of the project life cycle and within all areas of study considered as part of this EIA Report. The main aim for the assessment of cumulative impacts is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The significance of the cumulative impacts associated with the development of Kotulo Tsatsi Energy PV1 ranges from low to medium, depending on the impacts being considered. A summary of the cumulative impacts is included in **Table 9.2** below.

Table 9.2: Summary of the cumulative impact significance for Kotulo Tsatsi PV1 within the project site

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	High
Freshwater	Medium	Medium
Heritage	Low	Low
Socio-Economic	Medium (Positive) Low (Negative)	High (Positive) Medium (Negative)
Visual	Medium	Medium

Based on the specialist cumulative assessment and findings, the development Kotulo Tsatsi Energy PV1 and its contribution to the overall impact of all existing and proposed solar energy facilities within a 30km radius, it can be concluded that cumulative impacts will be of a low to high significance, with impacts of a high significance mainly relating to positive socio-economic impacts and impacts on avifauna. It should, however, be noted that contribution of the Kotulo Tsatsi Energy PV1 to cumulative impacts to avifauna is low, and as a result the proposed development ought to be acceptable from an avifauna perspective.

Therefore, the development of Kotulo Tsatsi Energy PV1 will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

CHAPTER 10. CONCLUSIONS AND RECOMMENDATIONS

Kotulo Tsatsi Energy (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kotulo Tsatsi Energy PV1) located on a site located approximately 70km south-west of the town of Kenhardt and 60km north east of Brandvlei in the Northern Cape Province. The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200MW. The facility will be located within the farm Portion 3 of Farm Styns Vley 280. The project site falls under the Hantam Local Municipality which is part of Namakwa District Municipality. The site is accessible via an existing gravel farm road (known as Soafskolk Road) which provides access to the farm off of the R27 which is located east of the project site.

A development envelope of 847ha has been identified within the broader development area by the proponent for the development of Kotulo Tsatsi Energy PV1 and associated infrastructure, which has been fully considered within this EIA process and assessed in terms of its suitability from an environmental and social perspective within this EIA Report.

The development envelope is regarded as being of a sufficient extent to provide opportunity for the avoidance of major environmental sensitivities. Kotulo Tsatsi Energy PV1 will have a contracted capacity of up to 200MW and will include specific infrastructure, namely:

- Solar PV array footprint comprising of:
  - PV modules and mounting structures
  - Inverters and transformers
  - Integrated Energy Storage System (IESS)
  - Cabling between the project components
  - Internal access roads
- Access roads, internal distribution roads and fencing around the development footprint
- Admin block comprising of:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage
  - Assembly plant
  - Laydown areas

Site-specific studies and assessments have delineated areas of potential sensitivity within the identified project site. From a regional perspective, the Kenhardt area is considered favourable for the development of a commercial solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the extent of the affected property, the availability of a direct grid connection (i.e. a point of connection to the national grid) and the availability of land on which the development can take place. Furthermore, other authorised solar facilities are located within the study area to the west of the development area. The PV facility is planned to be located adjacent to the authorised 100MW Kotulo Tsatsi PV2 facility, and within an area previously authorised for Concentrated Solar Power (CSP) project infrastructure.

The PV infrastructure assessed in this application is in response to the Applicant's need to change the authorised generation technology for the facility located on the farm Portion 3 of Farm Styns Vley 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the solar PV facility will be connected to the grid via a previously authorised grid connection

solution , which consists of a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site.

Kotulo Tsatsi Energy PV1 is planned to be bid into the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply with Kotulo Tsatsi Energy PV1 set to inject up to 200MW$_{AC}$ into the national grid.

As the project has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction and operation of Kotulo Tsatsi Energy PV1. Kotulo Tsatsi PV2 and CSP Facilities are already authorised. Therefore, only the potential environmental impacts associated with the construction, operation and decommissioning phases of the 200MW Kotulo Tsatsi Energy PV1 facility and associated infrastructure are assessed in this EIA Report.

10.1 Legal Requirements as per the EIA Regulations, 2014 (as amended). For the undertaking of an EIA Report

This chapter of the EIA report includes the following information required in terms of Appendix 2: Content of EIA Report.

Requirement	Relevant Section
3(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	A summary of the findings of the specialist studies undertaken for Kotulo Tsatsi Energy PV1 facility 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 Kotulo Tsatsi Energy PV1 facility has been included as section 10.5. Sensitive environmental features located within the study area and development area, overlain with the proposed development footprint have been identified and are shown in Figure 10.1. An optimised layout of the project footprint based on identified sensitivities is contained in Section 10.4 and Figure 10.2 and 10.3. A summary of the positive and negative impacts associated with Kotulo Tsatsi Energy PV1 infrastructure has been included in section 10.2.
h (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	A concluding statement indicating the preferred alternatives and the preferred location of the activity is included in section 10.5.
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation of the Kotulo Tsatsi Energy PV1 facility have been included in section 10.5.
3(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it	A reasoned opinion as to whether Kotulo Tsatsi Energy PV1 should be authorised has been included in section 10.5.

Requirement	Relevant Section
should be authorised, any conditions that should be made in respect of that authorisation.	

10.2 Evaluation of Kotulo Tsatsi Energy PV1 Facility

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 proposed Kotulo Tsatsi Energy PV1. This chapter concludes the environmental assessment of Kotulo Tsatsi Energy PV1 and associated infrastructure by providing a summary of the results and conclusions of the assessment of the development area. In so doing, it draws on the information gathered as part of the EIA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of features of high sensitivity within the project development envelope by the development footprint and the undertaking of monitoring, as specified by the specialists. Some mitigation measures have already been considered and implemented through the micro-siting of the solar PV facility development footprint, such as the avoidance of the drainage line located within the development area.

The potential environmental impacts associated with Kotulo Tsatsi Energy PV1 identified and assessed through the EIA process include:

- Impacts on ecology, flora and fauna.
- Impacts on freshwater resources.
- Impacts on avifauna.
- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area imposed by the components of the facility.
- Socio- economic impacts.

10.2.1 Impacts on Ecology (including flora and fauna)

The Terrestrial Ecology Assessment (**Appendix D**) undertaken determined that there are no impacts associated with the Kotulo Tsatsi Energy PV1 project that cannot be mitigated to an acceptable level and as such, the assessed layout was considered acceptable. The surrounding habitat is very homogenous therefore, the habitat loss resulting from the development would not result in significant local habitat loss for fauna or disrupt any broader scale movement corridors for fauna. Also, the site falls outside of any CBAs, ESAs and NC-PAES focus areas with the result that impacts on CBAs and the ability to meet future conservation targets would be minimal.

With the application of mitigation and avoidance measures, the impact of the Kotulo Tsatsi Energy PV1 on the local environment can be reduced to an acceptable magnitude. Overall, there are no specific long-term impacts likely to be associated with the development of the Kotulo Tsatsi Energy PV1 project that cannot be reduced to a low significance. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

10.2.2 Impacts on Freshwater Resources

The Freshwater Resources Assessment (**Appendix F**) concluded that there several watercourses consisting of depression wetlands, and minor and major streams located within the project area. The depression wetland and major ephemeral washes together with their associated 30m buffer areas are regarded as no-go areas for development of the Kotulo Tsatsi Energy PV1 facility and are required to be avoided. It was, therefore, recommended by the specialist that the PV infrastructure be located outside of this feature of a high sensitivity, and that the significance of the remaining impacts assessed for the aquatic systems after mitigation would be low. Road construction/upgrading and laying of cables may occur in major washes only where the use of existing access roads is not an option. The minor ephemeral washes and drainage lines are not regarded as no-go areas.

With recommendations and mitigation measures in place, impacts on the surface water resource integrity and functioning can be potentially reduced to a sufficiently low level. This would be best achieved by avoiding the high sensitivity features and buffer areas, incorporating the recommended management and mitigation measures into an Environmental Management Programme (EMPr) for the site, together with appropriate rehabilitation guidelines and ecological monitoring recommendations.

Based on the findings of the Freshwater Resources Impact Assessment there is no objection to the authorisation of the proposed activities.

10.2.3 Impacts on Avifauna

The Avifauna Assessment (**Appendix E**) determined that the Kotulo Tsatsi Energy PV1 site held very low species richness and abundance of priority collision-prone birds or Red Data species. The development area of Kotulo Tsatsi Energy PV 1 lies outside the 3km Martial Eagle nest site buffer. The impact assessment is based on the findings of four field surveys undertaken in 2016 and summer 2020. The avifauna impact identified to be associated with the construction phase (including decommissioning) will be negative with a short-term duration and will have a magnitude ranging from moderate to low. For the operation phase, the impact will also be negative, with a long-term duration for the life of the facility and a magnitude of moderate to low.

During the construction phase (and decommissioning phase), direct avifauna impacts include habitat loss and disturbance related to vegetation clearance and the displacement of shy avifauna species as a result of noise and an increased human presence associated with construction-related activities. The significance of the construction phase impact will be low, with the implementation of mitigation measures.

Impacts on avifauna during the operation phase of Kotulo Tsatsi Energy PV1 include collisions with PV panels, and area avoidance. The significance of the impacts will be low, with the implementation of mitigation measures. No impacts of a high significance are expected to occur during the operation phase.

With the implementation of all project-specific recommendations and mitigation measures, there is no objection to the development of the Kotulo Tsatsi Energy PV1.

10.2.4 Impacts on Soil and Agricultural Potential

The determined land capabilities and climate capabilities of soils identified in the area, are associated with very restricted and very low land potential levels. No "High" land capability sensitivities were identified within the project area, including the development envelope. Considering the low sensitivity of the area to be affected by the project, the proposed activities will have an acceptable impact on agricultural productivity. It is therefore the specialist's opinion that the proposed activities may proceed as planned without the concern of loss of high sensitivity land capabilities or agricultural productivity (refer to **Appendix G** for a compliance statement).

10.2.5 Impacts on Heritage Resources (archaeological and paleontological)

No significant archaeological or other heritage resources of cultural significance located within the proposed Kotulo Tsatsi Energy PV1 development footprint (**Appendix H**). The impact rating was determined to be of low significance with mitigation, where required.

Construction-related activities are unlikely to have an impact on the fossil heritage if preserved within the development area, however, based on the experience of the specialist and the lack of any previously recorded fossils from the broader study area, it is unlikely that any fossil heritage will be preserved in the local lithology, and therefore the impact is considered to be of a low significance. As such, it is unlikely that the proposed development will negatively impact on significant palaeontological heritage on condition that the Chance Fossil Finds Procedure is implemented during excavation activities. The duration of the impact will be permanent should the impact occur and will have a low magnitude.

The specialist study recommended that the proposed Kotulo Tsatsi Energy PV1 facility should be authorised from an archaeological and paleontological perspective with the implementation of the recommended mitigation measures.

10.2.6 Visual Impacts

The Visual Impact Assessment (**Appendix I**) identified negative and neutral impacts on visual receptors during the construction and the operation phases. The impacts include a change in the character and sense of place of the landscape setting, a change in the character of the landscape as seen from the secondary roads, a change in the landscape as seen from local homesteads, glare impacts which could affect road users, and visual impacts related to the operational, safety and security lighting of the solar PV facility on observers.

The duration of the impacts is expected to be long-term for majority of the visual impacts and with a magnitude ranging from low to small. The significance of the impacts will be low or medium (depending on the impact being considered) with the implementation of mitigation. No impacts of a high significance are expected to occur and it can be concluded that the development of Kotulo Tsatsi Energy PV1 will be viewed in the context of the CSP facilities and the PV 2 project. The development of Kotulo Tsatsi Energy PV1 is therefore considered to be acceptable from a visual perspective.

Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flaws for the proposed Kotulo Tsatsi Energy PV1 facility. It is

therefore recommended, from a visual perspective that the development of the facility as proposed be supported, subject to the implementation of the recommended mitigation measures.

10.2.7 Social Impacts

The Social Impact Assessment (**Appendix J**) identified that most social impacts associated with the development of Kotulo Tsatsi Energy PV1 will have a short-term duration associated with the construction phase and long-term duration during the operation phase of the project. The magnitude of the impacts ranges from high to small (depending on the impact being considered) and the status thereof. Both positive and negative impacts have been identified for both the construction and operation phases of the development.

During the construction phase, negative impacts include, nuisance impacts (including noise and dust), an influx of construction workers and job seekers to the area and a change in population, safety and security impacts, impacts on daily living and movement patterns, visual and a sense of place impacts. The significance of the negative construction phase impacts will be low with the implementation of the recommended mitigation measures. The positive social impacts associated with the construction phase of Kotulo Tsatsi Energy PV1 include an economic multiplier effect; and direct and indirect employment and skills development opportunities. The significance of the positive impacts will be medium with the implementation of the recommended enhancement measures by the specialist.

Impacts associated with the operation of Kotulo Tsatsi Energy PV1 will be both positive and negative. The negative impacts are related to the change in the sense of place associated with the operation of the solar PV facility. The significance of the negative impacts will be low with the implementation of the recommended mitigation measures. The positive impacts associated with the operation of the facility relate to the development of non-polluting renewable energy infrastructure, a contribution to Local Economic Development (LED) and social upliftment, and the creation of employment and skill development opportunities for the local economy and the country. The significance of the positive impacts will be low and medium with the implementation of the recommended enhancement measures.

Kotulo Tsatsi Energy Pv1 is unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that Kotulo Tsatsi Energy PV1 can be authorised from a social perspective.

10.2.8 Assessment of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa and within the surrounding areas of the development area. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

Based on the specialist cumulative assessment and findings (**Appendix D** to **Appendix J** and Chapter 9 of the EIA), the development Kotulo Tsatsi PV1 and its contribution to the overall impact of all existing and proposed solar energy facilities within a 30km radius, it can be concluded that cumulative impacts will be of a low to high significance, with impacts of a high significance mainly relating to positive socio-economic impacts and to impacts on avifauna. It should however be noted that contribution of the Kotulo Tsatsi Energy PV1 to cumulative impacts to avifauna is low, and as a result the proposed development of the PV facility ought to be acceptable from an avifauna perspective.

Therefore, the development of Kotulo Tsatsi PV1 will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

10.3 Environmental Sensitivity Mapping

As part of the specialist investigations undertaken within the project development area, which includes the development envelope, specific environmental features and areas were identified which will be impacted by the placement of Kotulo Tsatsi Energy PV1. The current condition of the features identified (i.e. intact or disturbed) will inform the sensitivity of the environmental features and its capacity for disturbance and change associated with the proposed development.

The environmental features identified within and directly adjacent to the development envelope and development footprint are illustrated in Figure 10.1. The features identified specifically relate to ecological and avifauna habitats, freshwater resources and heritage resources. The following points provide a description of those features of very high and high sensitivity identified within the development envelope:

- Ecologically sensitive washes dominated by *Rhigozum trichotomum*. These areas are of *high sensitivity*, but not considered to be no-go areas. Some development in the washes areas is considered acceptable, however, some caution should be exercised regarding vegetation clearing in these areas.
- *Very High sensitivity* drainage features/major washes are regarded as no-go areas for development and the feature plus a 30m buffer area must be avoided as far as possible. Where Very High sensitivity features need to be traversed, existing roads or disturbance footprints should be used as far as possible.
- Although no part of the Kotulo Tsatsi PV1, lies within the 3km buffer around the inactive Martial Eagle nest, the 3km nest buffer is still *high sensitivity* and a no-go area.

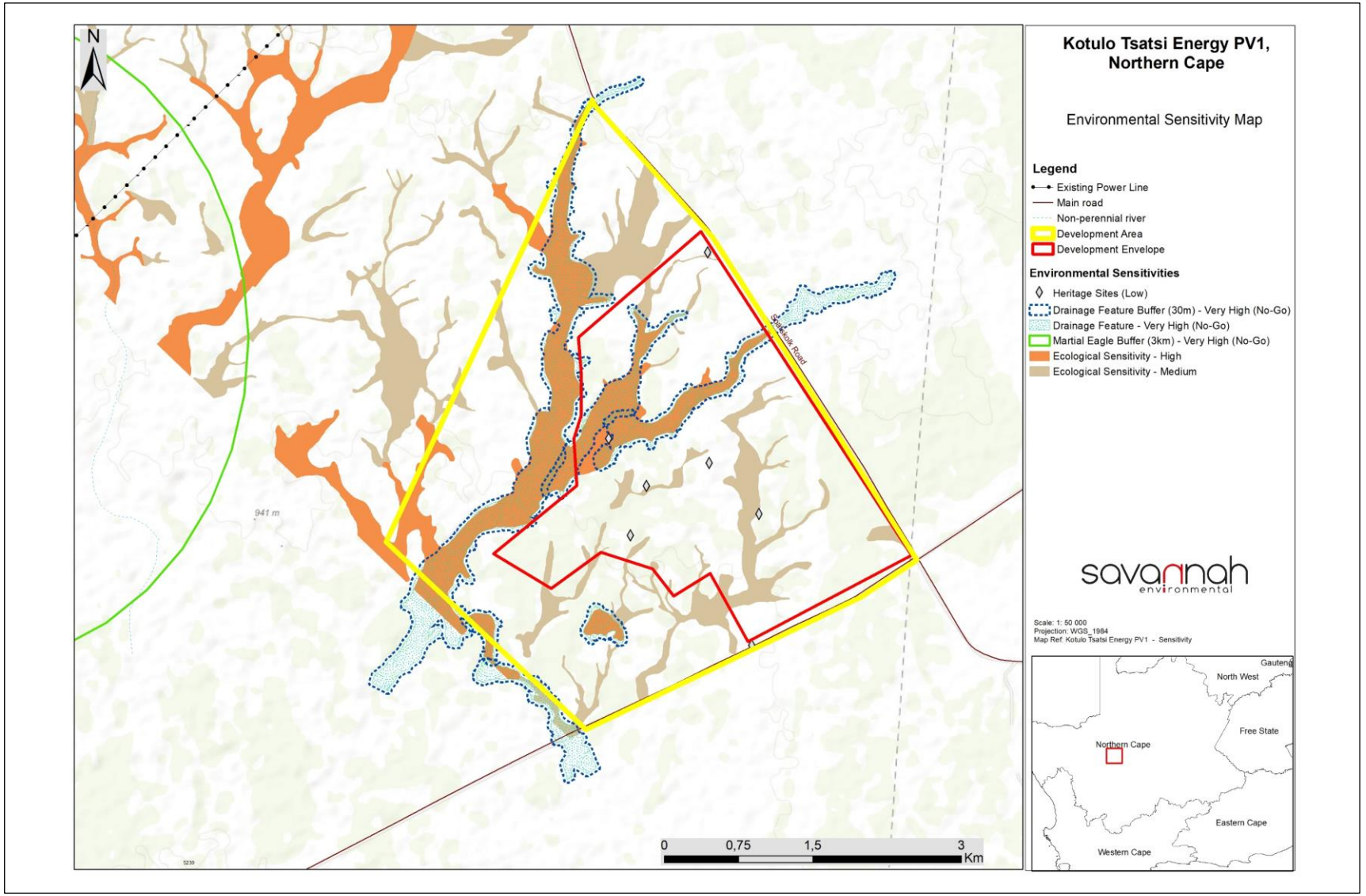

Figure 10.1: Sensitive environmental features identified within the development envelope assessed for Kotulo Tsatsi Energy PV1 (A3 map is included in Appendix O).

10.4 Optimisation of Layout

In the Scoping Phase, a development footprint was designed by the project developer in order to respond to and avoid the sensitive environmental and social features mapped within the development envelope. This approach ensured the application of the mitigation hierarchy (i.e. avoid, minimise, mitigate and offset) for the Kotulo Tsatsi Energy PV1 facility layout. Further to the detailed specialist assessments in the EIA phase, the further application of the avoidance step of the mitigation hierarchy was required to be implemented by the developer, and an optimised facility layout has been developed. This optimised facility layout is in direct response to the need to avoid features identified to be of high and very high sensitivity, or demarcated as a no-go areas. With the implementation of the optimised layout, the development footprint is suitable and appropriate from an environmental perspective for the development of the Kotulo Tsatsi Energy PV1 facility, as it ensures the avoidance, reduction and/or mitigation of all identified detrimental or adverse impacts on sensitive features as far as possible. The optimised layout is recommended as the preferred layout for implementation (**Figure 10.2**).

The optimised facility layout is 551ha in extent, and includes an optimised PV array and IESS layout, as well as an optimised admin block/assembly plant/laydown area layout. While avoiding all no-go areas (that is areas not suitable for development) and identified sensitivities, it is confirmed that the area remains sufficient in extent for the development of the 200MW PV facility and associated infrastructure.

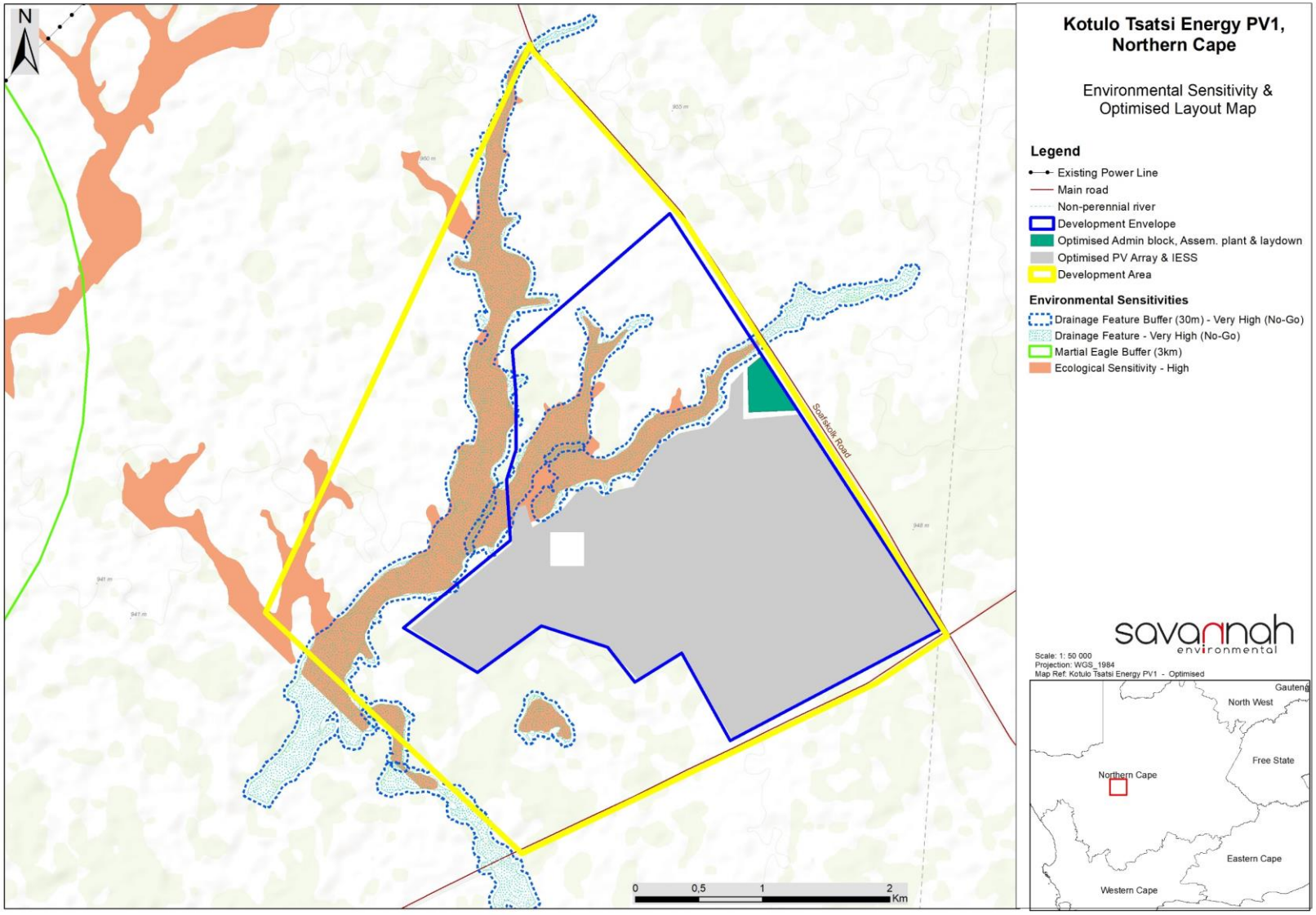

Figure 10.2: Final preferred (optimised) development footprint for Kotulo Tsatsi Energy PV1 facility overlain with high environmental sensitivities, and avoiding no-go areas (A3 map included in Appendix O)

10.5 Environmental Costs of the solar PV Facility versus Benefits of the solar PV Facility

Environmental costs (including those to the natural environment, economic and social environment) can be anticipated at a local and site-specific level and are considered acceptable provided the mitigation measures as outlined in the EIA Report and the EMPr are implemented and adhered to. No fatal flaws have been identified. These environmental costs are discussed below.

Environmental costs identified for the project include:

- Direct loss of biodiversity, flora, fauna, and avifauna due to the clearing of land for the construction and utilisation of land for the project (which is limited to the development footprint). This impact is minimised through the placement of the Kotulo Tsatsi Energy PV1 facility within the already authorised footprint of the CSP 1 development area.
- Impact to major drainage features as a result of the development of the PV1 facility. Direct and indirect impact to drainage features can be avoided by implementation of specialist mitigation measures (demarcation of no-go and buffer areas etc.)
- Visual impacts associated with the project. The location of the facility within an area characterised by vast space and vegetation and other energy development mitigates the visual impact of the facility to a large extent.

The positive implications of establishing the project on the demarcated site include:

- The project will result in important socio-economic benefits at the local and regional scale through job creation, procurement of materials and provision of services and other associated downstream economic development. These will persist during the pre-construction, construction and operation phases of development.
- The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy development.
- The development will supplement and stabilise the landowner's income in an area where farming is susceptible to prolonged droughts.

The costs associated with the project are anticipated to occur at a site specific level, the significance of which can be largely reduced through the application of appropriate mitigation measures, and through the appropriate placement of infrastructure within areas of lower sensitivity identified on site. Due to the fact that the benefits of the project are expected to occur at a larger scale (i.e. national, regional and local level), the expected benefits of the project are expected to partially offset the localised environmental costs of the project.

10.6 Overall Conclusion (Impact Statement)

A technically viable development area and development footprint was proposed by the developer and assessed as part of the EIA process. The environmental assessment of the development envelope (facility layout) within the development area was undertaken by independent specialists and their findings have informed the results of this EIA Report.

The specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of Kotulo Tsatsi PV1. The developer had proposed a technically viable layout for the project and associated infrastructure which has been assessed as part of the independent specialist studies. Through this assessment an optimised and preferred development footprint from an environmental perspective has been identified for the project. High sensitivity freshwater features, which are regarded as no-go areas, were identified within the development envelope. The reconfiguration of the PV array and associated infrastructure to remain outside of this demarcated area minimises environmental impacts as far as possible. The preferred (optimised) layout is therefore considered as the most appropriate from an environmental perspective and is considered to be acceptable within all fields of specialist study undertaken for the project. All impacts associated with the preferred layout can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. The layout map included as **Figure 10.3** is considered to be the preferred facility layout for Kotulo Tsatsi Energy PV1.

In addition, through the assessment undertaken in this EIA report the following can be concluded regarding the key environmental considerations in terms of the IFC Project Developers Guide for Kotulo Tsatsi Energy PV1:

- Construction phase impacts (i.e. OHS, temporary air emissions from dust and vehicle emissions, noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites and worker accommodation) will be local in extent and of a low magnitude. The significance of impacts associated with the construction phase will be of a low to medium rating due to the remote location of the site. Those impacts associated with a temporary workforce will be of moderate significance for the local community for the duration of the construction period, as additional people will be residing in the area.
- Water usage (i.e. the cumulative water use requirements) will be kept to a minimum during construction and operation of the project. Appropriate water demand and conservation measures will be implemented.
- Matters relating to the land will be of low significance. The land is already owned by the project development company and there will be no impact to the current grazing practises due to the full extent of land available for this activity. There will be no involuntary land acquisition / resettlement associated with this project.
- Landscape and visual impacts (i.e. the visibility of the solar panels within the wider landscape and associated impacts on landscape designations, character types and surrounding communities) will be of low to medium significance due to the remote location of the project.
- Ecology and natural resources (i.e. habitat loss/fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species) will be impacted on by the project. From an ecological perspective the project site is largely of low habitat and faunal diversity, and impacts on high sensitivity areas can be avoided through the implementation of the optimised layout as well as appropriate mitigation measures.
- Cultural heritage (i.e. impacts on the setting of designated sites or direct impacts on below-ground archaeological deposits as a result of ground disturbance during construction) is of low impact significance, and no heritage resources of significance are associated with the development area.
- Transport and access (i.e. impacts of transportation of materials and personnel) related to the project will be appropriately managed, and will make use of existing access roads during construction and operation.

» Drainage/flooding risks are of low concern. Designated no-go and buffer areas have been identified for sensitive freshwater features which curtail water movement during high flow events. The study area is a low rainfall area, but is prone to flash flooding during high rainfall events. The water features are excluded from the project development foo[tint to reduce risk to the project infrastructure and prevent erosion.
» Consultation and disclosure (i.e. consulting with key authorities, statutory bodies, affected communities and other relevant stakeholders) has been undertaken for the project throughout the entire assessment phase, and documented for inclusion in the assessment of the project. All stakeholders and interested and affected parties have been offered the opportunity to participate in a meaningful way to the EIA for the project.
» An Environmental Management Programme (EMPr) has been compiled to ensure that mitigation measures are identified and taken forward as the project develops (refer to Appendix L of EIA Report).

Therefore, through the assessment of the development of the Kotulo Tsatsi PV1 within the development footprint it can be concluded that the development of the facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures).

10.7 Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the optimised development footprint which avoids all identified no-go/highly sensitive environmental features within the project site, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the development of the Kotulo Tsatsi Energy PV1 is acceptable within the landscape and can reasonably be authorised. The facility layout is illustrated in **Figure 10.4**. The period for which the Environmental Authorisation is required to remain valid is 10 years from the date of authorisation, with a period of 5 years for the design, planning, construction and commissioning of the activity to be concluded.

The PV infrastructure assessed in this application is in response to the Applicant's need to change the authorised generation technology for the facility located on the farm Portion 3 of Farm Styns Vley 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the solar PV facility will be connected to the grid via a previously authorised grid connection solution[30], which consists of a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site.

The authorisation for Kotulo Tsatsi Energy PV1 would include the following key infrastructure and components:

» Solar PV array footprint comprising of:

30 A CSP facility plus associated infrastructure, including a complete grid connection to Aries Substation was previously authorised on the site. This PV facility infrastructure replaces the CSP facility infrastructure, and will retain the authorised grid connection solution (including all substations and power lines) and other associated infrastructure (including the man camp (including on-site accommodation), all water reservoirs and pipelines, the power block and thermal storage.

    - PV modules and mounting structures
    - Inverters and transformers
    - Integrated Energy Storage System (IESS)
    - Cabling between the project components
    - Internal access roads
  - Access roads, internal distribution roads and fencing around the development footprint
  - Admin block comprising of:
    - Site offices and maintenance buildings, including workshop areas for maintenance and storage
    - Assembly plant
    - Laydown areas

The following key conditions would be required to be included within an authorisation issued for Kotulo Tsatsi Energy PV1:

- All mitigation measures detailed within this EIA 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 EIA Report should form part of the contract with the Contractors appointed to construct and maintain the Kotulo Tsatsi Energy PV1 in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of project is considered key in achieving the appropriate environmental management standards as detailed for this project.
- The high sensitivity major ephemeral washes and their associated buffer areas should be regarded as no-go areas for all construction activities apart from road construction/upgrading and lying of cables, and only where the use of existing access roads is not an option.
- Following the final design of Kotulo Tsatsi Energy PV1, a final layout must be submitted to DFFE for review and approval prior to commencing with construction.
- A pre-construction walk-through of the final development footprint 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, must be counted and marked and translocated, where deemed necessary by the ecologist conducting the pre-construction walk-through survey. Permits from the relevant national and provincial authorities, i.e. the Northern Cape Department of Agriculture, Environment Affairs, Rural Development and Land Reform (DAEARD&LR) and the Department of Forestry, Fisheries, and the Environment (DFFE), must be obtained before the individuals are disturbed.
- The necessary water use authorisation must be obtained from the Department Human Settlements, Water and Sanitation(DHSWS) for impacts to a watercourse prior to construction.
- The final project footprint must be kept as small as possible and must consider all sensitive environmental features not considered to be suitable for development (as identified by the respective specialists).
- A Chance Find Protocol must be developed and implemented in the event that archaeological or palaeontological resources are found. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately.

» Alien invasive species management at the site should take place according to the Alien Invasive Management Plan. This should make provision for alien monitoring and management for at least 5 years after decommissioning.

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