Kotulo Tsatsi Energy PV3

Northern Cape Province

Environmental Impact Assessment Report

DFFE Ref: 14/12/16/3/3/2/2223

April 2023

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PROJECT DETAILS

DFFE Ref No:	:	14/12/16/3/3/2/2223
Title	:	Environmental Impact Assessment for the Kotulo Tsatsi Energy PV3
Authors	:	Savannah Environmental (Pty) Ltd Debbie-Lee Janse van Rensburg Nkhensani Masondo Karen Jodas
Client	:	Kotulo Tsatsi Energy (Pty) Ltd
Report Revision	:	Draft for public review and comment
Date	:	April 2023

When used as a reference this report should be cited as: Savannah Environmental (2023) Environmental Impact Assessment Report for the Kotulo Tsatsi Energy PV3, Northern Cape Province.

PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT

The Applicant, Kotulo Tsatsi Energy (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kotulo Tsatsi Energy PV3) 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 480MW. The facility will be located within the farm Portion 2 of Farm Styns Vley 280. The PV facility is planned to be located within an area previously authorised for CSP project infrastructure, which is adjacent to the authorised Kotulo Tsatsi Energy PV1 and PV2 Facilities as well as the authorised CSP3 facility and associated infrastructure. 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.

Kotulo Tsatsi Energy (Pty) Ltd has appointed Savannah Environmental as the independent environmental consultant to undertake the Scoping and Environmental Impact Assessment Process for the Kotulo Tsatsi Energy PV3. The EIA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998). This Environmental Impact Assessment report has been compiled in accordance with Appendix 3 of the EIA Regulations, 2014 (as amended) and consists of the following sections:

This EIA Report consists of ten chapters, which include:

- **Chapter 1** provides background to the Kotulo Tsatsi Energy PV3 project and the environmental impact assessment.
- **Chapter 2** provides a project description of the Kotulo Tsatsi Energy PV3 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 PV3.
- **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 is available for review and comment from **Tuesday, 4 April 2023** to **Monday, 8 May 2023** at (https://savannahsa.com/public-documents/energy-generation/). All comments received and recorded during the 30-day review and comment period will be included, considered and addressed within the final EIA report for the consideration of the Department of Forestry, Fisheries and the Environment (DFFE).

Please submit your comments by **Monday, 8 May 2023** to:
Nicolene Venter PO Box 148, Sunninghill, 2157 Tel: 011-656-3237 Fax: 086-684-0547 Email: publicprocess@savannahsa.com

Comments can be made as written submission via fax, post or email.

EXECUTIVE SUMMARY

Kotulo Tsatsi Energy (Pty) Ltd is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kotulo Tsatsi Energy PV3) 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 480MW. The facility will be located within the farm Portion 2 of Farm Styns Vley 280. The PV facility is planned to be located within an area previously authorised for CSP project infrastructure[1], which is adjacent to the authorised Kotulo Tsatsi Energy PV1 and PV2 Facilities as well as the authorised CSP3 facility and associated infrastructure. 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.

The PV facility is planned to be located adjacent to the authorised Kotulo Tsatsi Energy PV1 and Kotulo Tsatsi Energy PV2 facilities, 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. A development area[2] of ~ 1888ha was defined through the Scoping evaluation of the site and has now been assessed for the facility footprint. The development footprint[3] has an extent of ~1350ha.

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 2 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 132kV grid connection solution to the authorised 400kV collector substation located on Portion 2 of Farm Styns Vley 280, and will comprise on-site switching substations, facility substations and a 132kV power line within a 500m wide corridor.

Infrastructure associated with the solar PV facility contracted capacity of up to 480MW will include:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- Access roads, internal distribution roads and fencing around the development area.
- Two substation and BESS hubs, including:
  - Battery Energy Storage System (BESS)
  - On-site facility substations, switching substations
- 132kV power line within a 300m wide corridor to facilitate the connection between the PV Facility and the authorised 400kV collector substation.

1

2 The development area is that identified area (located within the project site) where the Kotulo Tsatsi Energy PV3 facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~1834ha in extent.

3 The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for Kotulo Tsatsi Energy PV3 is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

» O&M and laydown area hub, including:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Laydown areas and temporary construction camp area.

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 PV3 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 PV3 set to inject up to 480MW_{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 PV3.

The potential environmental impacts associated with PV3 identified and assessed through the EIA process include:

» Impacts on ecology, including 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.
» Social impacts.

Impacts on Ecology

The Terrestrial Ecology Assessment (**Appendix D**) determined that there are no impacts associated with the Kotulo Tsatsi Energy PV3 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 flora or fauna, or disrupt any broader scale movement corridors for fauna. Also, the development footprint is positioned outside of any CBAs, ESAs and Northern Cape-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 PV3 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 PV3 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 Avifauna

The Avifaunal Assessment (**Appendix E**) determined that the Kotulo Tsatsi Energy PV3 site held very low species richness and abundance of priority collision-prone birds or Red Data species. This suggests the suitability for PV development. Furthermore, the development area of Kotulo Tsatsi Energy PV3 lies outside the 3km Martial Eagle nest site buffer, and will reduce the impacts of habitat loss for future breeding Martial Eagles. The anticipated avifauna impacts listed with mitigation is low significance. Therefore, if recommendations and mitigations are followed, there is no objection to the development of the Kotulo Tsatsi Energy PV3.

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 along with their associated 30m buffer areas, are regarded as No-Go areas for development of the Kotulo Tsatsi Energy PV3 facility. The minor ephemeral washes and drainage lines located within the current development footprint is not regarded as no-go areas for the placement of infrastructure.

With the implementation of the mitigation measures, all impacts would be reduced to a moderate or low significance which is considered to be acceptable. There are no fatal flaws associated with the development footprint. Although there is limited footprint within the high sensitivity areas, this is associated with existing road alignments. Given the avoidance of sensitive features at the site by the facility layout no high impacts are likely to occur as a result of the development.

Based on the outcomes of this study it is the specialists considered opinion that the proposed Kotulo Tsatsi Energy PV3 project can be authorised from a freshwater resource perspective.

Impacts on Land Use, 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 (refer to **Appendix G**). 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.

Impacts on Heritage Resources (archaeological and paleontological)

No significant archaeological or other heritage resources of cultural significance located within the proposed Kotulo Tsatsi Energy PV3 development footprint (**Appendix H**). The impact significance was determined to be of low significance with mitigation, where required.

Although the proposed development lies in a geological area of high palaeontological sensitivity, the conditions on the ground are such that the actual palaeontological sensitivity is low. As such, it is unlikely that the proposed development will negatively impact on significant palaeontological heritage on

condition that the Chance Fossil Finds Procedure (provided in **Appendix H**) is implemented during excavation activities.

The specialist study recommended that the proposed Kotulo Tsatsi Energy PV3 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**) undertaken determined that the visual environment surrounding Kotulo Tsatso Energy PV3, especially within a 1 - 3km radius, may be visually impacted during the anticipated operational lifespan of the facility.

The anticipated visual impacts listed with mitigation range from medium to low significance. 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 PV3 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 impacts identified will be either of a low or medium 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 PV3. 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. 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.

Assessment of Cumulative Impacts

Based on the specialist cumulative assessment and findings (**Appendix D** to **Appendix J** and Chapter 9 of the EIA), the development and its contribution to the overall impact of all renewable energy facilities to be developed within a 30km radius, it can be concluded that the Kotulo Tsatsi Energy PV3 Facility cumulative impacts will be of a medium to low significance, with impacts of a high significance relating to positive socio-economic impacts. It was concluded that the development of the Kotulo Tsatsi Energy PV3 Facility will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

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 PV3. Areas or features of very high to high sensitivity identified are as follows:

- Critical Biodiversity Areas are regarded as no-go areas for development.
- Very High sensitivity ephemeral drainage lines and habitat, and pan features habitat are regarded as no-go areas for development and 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 from a freshwater perspective.
» Boesmansland Vloere Habitat is of high sensitivity and considered to be no-go areas for development and must be avoided as far as possible.
» The 3km buffer around the inactive Martial Eagle nest is considered to be no-go areas for development and must be avoided as far as possible.
» High ecologically sensitive washes dominated by *Rhigozum trichotomum*. These areas are 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.

» Where these features are avoided by the facility layout as the mitigation measure, impacts on the identified sensitive areas can be avoided (i.e. adequately managed).

Assessment of the Proposed Facility Layout

In response to the identified need to adequately manage impacts within sensitive areas identified on the site development footprint, and in order to demonstrate the commitment of the project to adhere to recommended mitigation measures, the project developer has developed a best practice mitigation strategy with regards to the facility layout.

The optimised development footprint was designed by the project developer in order to respond to and avoid the sensitive environmental features located within the development area. This approach ensured the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate and offset), which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the development area (located within the project site). With the implementation of the optimised layout, the development footprint is suitable and appropriate from an environmental perspective for Kotulo Tsatsi Energy PV3, 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, and represents a positive outcome in terms of impact reduction and mitigation and the optimal layout for the facility. As such, the impact of this Optimised Final Layout is considered to be acceptable and preferred.

The EIA recommendations have been taken into account by the project developer, and the facility layout has been refined to avoid the following:
» Freshwater features buffer associated with the central ephemeral drainage line
» Critical Biodiversity Areas 1
» The 3km buffer around the inactive Martial Eagle

Overall Conclusion & Recommendations

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using solar irradiation as the preferred technology, due to the availability of a suitable solar resource. Independent specialists appointed to undertake the assessment of potential impacts associated with the project assessed a larger area in order to inform the best location for the solar facility infrastructure. The Specialists considered desktop data, results from field work, existing literature and the National Web-based Environmental Screening Tool to inform the identification of sensitivities. A proposed

layout was designed after provision of sensitivity data by the specialists with the aim of avoiding the identified sensitive areas.

Based on the specialist investigations of the larger area, a technically viable development footprint was proposed by the developer and assessed as part of the EIA process. The findings of the assessment of the development footprint undertaken by independent specialists have informed the results of this report. The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the project within the project site.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and National level. The project development area is located outside of any protected area, outside of any Critical Biodiversity Areas (CBAs) as defined in the Provincial Conservation Plan, and from the development footprint avoids any freshwater resource features. When considering biodiversity and socio-economic benefits and impacts on the affected and surrounding areas, the following is concluded from the specialist studies undertaken within this EIA process.

From a biodiversity perspective, the site is not located within a protected area. There are no specific long-term impacts likely to be associated with biodiversity or freshwater resources which cannot be reduced to a moderate or low significance. There are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding. Avifauna sensitivities were identified and avoided by the development footprint. This approach is in line with the application of the mitigation hierarchy, where all the sensitive areas which could be impacted by the development have been avoided (i.e. tier 1 of the mitigation hierarchy). Where impacts could not be avoided, appropriate mitigation has been proposed to minimise impacts. It follows therefore that the project does not adversely impact on the ecological integrity of the area.

The Social Impact Assessment has identified short-term (construction related) impact indicators and operational related socio-economic impact indicators. The assessment of the proposed facility, and its net effect from a socio-economic perspective, indicates that the project would generate greater socio-economic benefits during both the construction and operational phases than the potential losses that could occur as a result of its establishment.

As detailed in the cost-benefit analysis, the benefits of the Kotulo Tsatsi Energy PV3 Facility are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the PV facility. From an economic perspective, both positive and negative impacts are expected.

Based on the conclusions of the specialist studies undertaken, it can be concluded that the development of the Kotulo Tsatsi Energy PV3 Facility based on the current layout as provided by the Applicant will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

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

480MW Solar PV facility: Kotulo Tsatsi Energy PV3 Facility located within farm Portion 2 of Farm Styns Vley 280, including:

» Solar PV array comprising PV modules and mounting structures.
» Inverters and transformers.
» Cabling between the project components.
» Access roads, internal distribution roads and fencing around the development area.
» Two substation and BESS hubs, including:
  - Battery Energy Storage System (BESS)
  - On-site facility substations, switching substations
» 132kV power line within a 300m wide corridor to facilitate the connection between the PV Facility and the authorised 400kV collector substation.
» O&M and laydown area hub, including:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Laydown areas and temporary construction camp area.

The following key conditions would be required to be included within an authorisation issued for Kotulo Tsatsi Energy PV3:

» Where feasible, 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 L1** to **Appendix L3** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the Kotulo Tsatsi Energy PV3 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.
» Exclude the sensitive major ephemeral washes and their associated buffer 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.
» Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan.
» A chance find procedure 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 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.
» Maintain vegetation cover (i.e. either natural or cultivated) immediately adjacent to the actual development footprint, both during construction and operation of the proposed facility.
» Monitor all rehabilitated areas for one year following decommissioning and implement remedial actions as and when required.

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

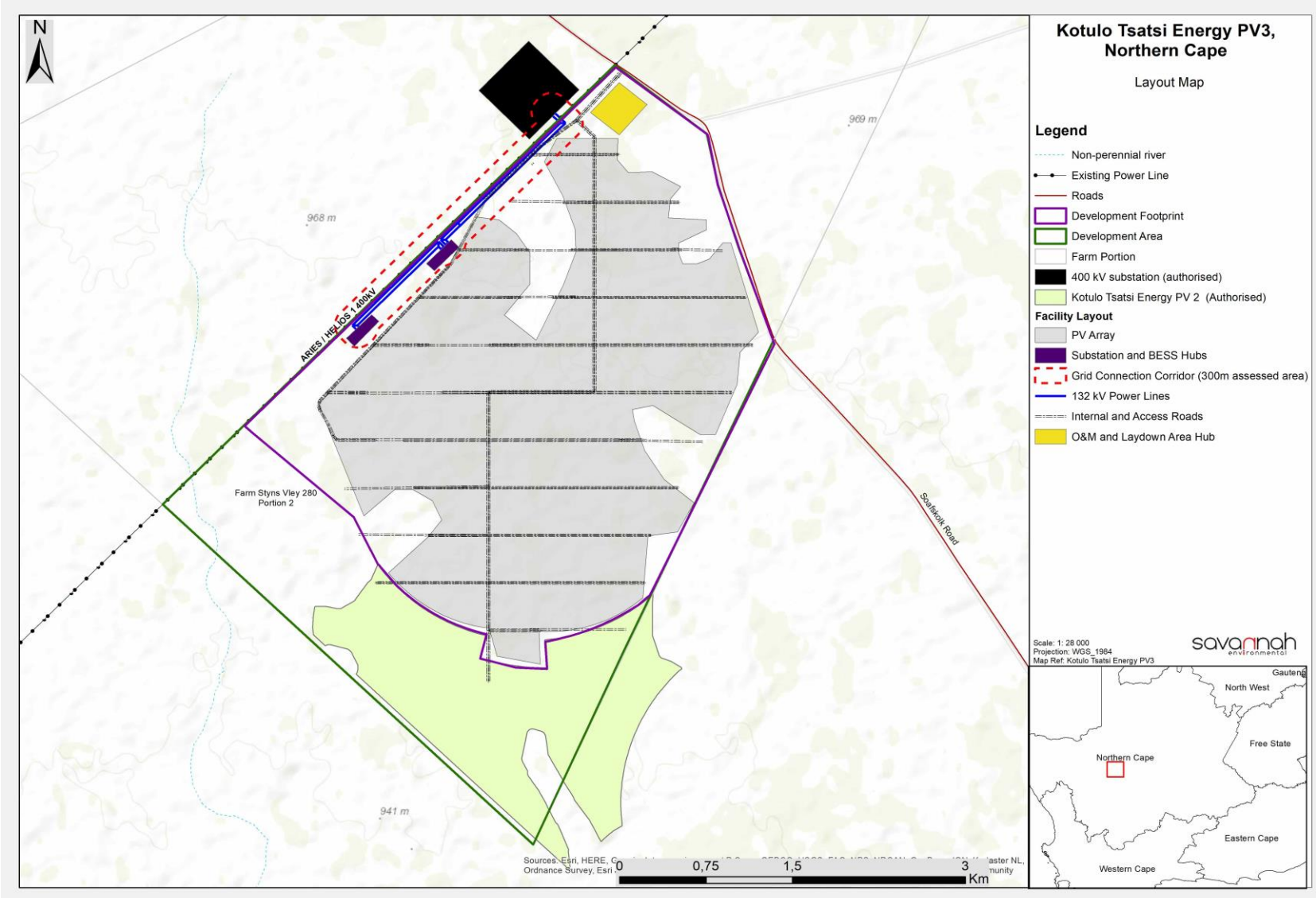

Figure 1.: Layout map of the SRPM Solar PV Facility development area and the grid connection corridor (refer to **Appendix N** for map).

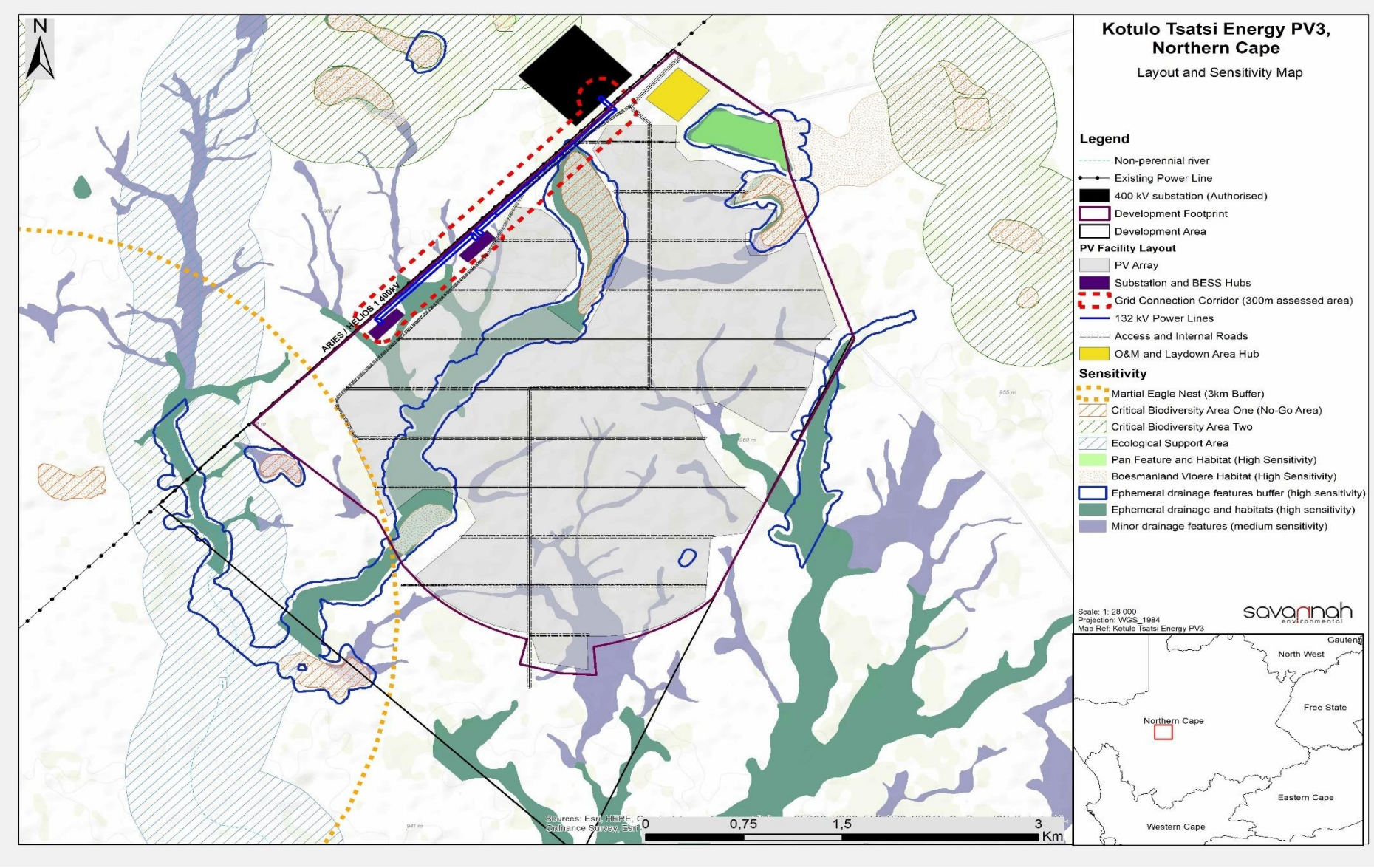

Figure 2: Layout and sensitivity map of the preferred development footprint and grid connection corridor for the Kotulo Tsatsi Energy PV3, as was assessed as part of the EIA process (**A3 map is included in Appendix N)**

DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

Development area: The development area is that identified area (located within the project site) which has been assessed by specialists within this Scoping Report with the aim of identifying areas of sensitivity which should be avoided by the development footprint or facility layout. The development area is ~1888ha in extent.

Development footprint: The development footprint is the defined area (located within the development area) where the Solar PV Energy Facility and other associated infrastructure for the Project is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

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

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.

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

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.

Project developer: The project developer, SRPM (Pty) Ltd will be the partly responsible for the construction and day-to-day operation and maintenance of the proposed Solar PV Facility.

Project site: The project site is the aerial extent of the affected properties (~300ha) within which the SRPM Solar PV Facility is proposed.

Proponent: Applicant/Project Developer, SRPM Solar (Pty) Ltd will be the partly responsible for the construction and day-to-day operation and maintenance of the proposed Solar PV Energy Facility.

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

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

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

ACRONYMS

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fisheries, and the Environment (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
HGM	Hydrogeomorphic
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
m	Metre
m^2	Square meters
m^3	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)
NWDEDECT	North West Department of Economic Development, Environment, Conservation and Tourism
ONA	Other Natural Area
PA	Protected Area
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 PV3) 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 480MW. The facility will be located within the farm Portion 2 of Farm Styns Vley 280. The PV facility is planned to be located within an area previously authorised for CSP project infrastructure, which is adjacent to the authorised Kotulo Tsatsi Energy PV1 and PV2 Facilities as well as the authorised CSP3 facility and associated infrastructure. 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.

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 area to the west, south and east of the development area.

Kotulo Tsatsi Energy PV3 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 PV3 set to inject up to 480MW_{AC} into the national grid.

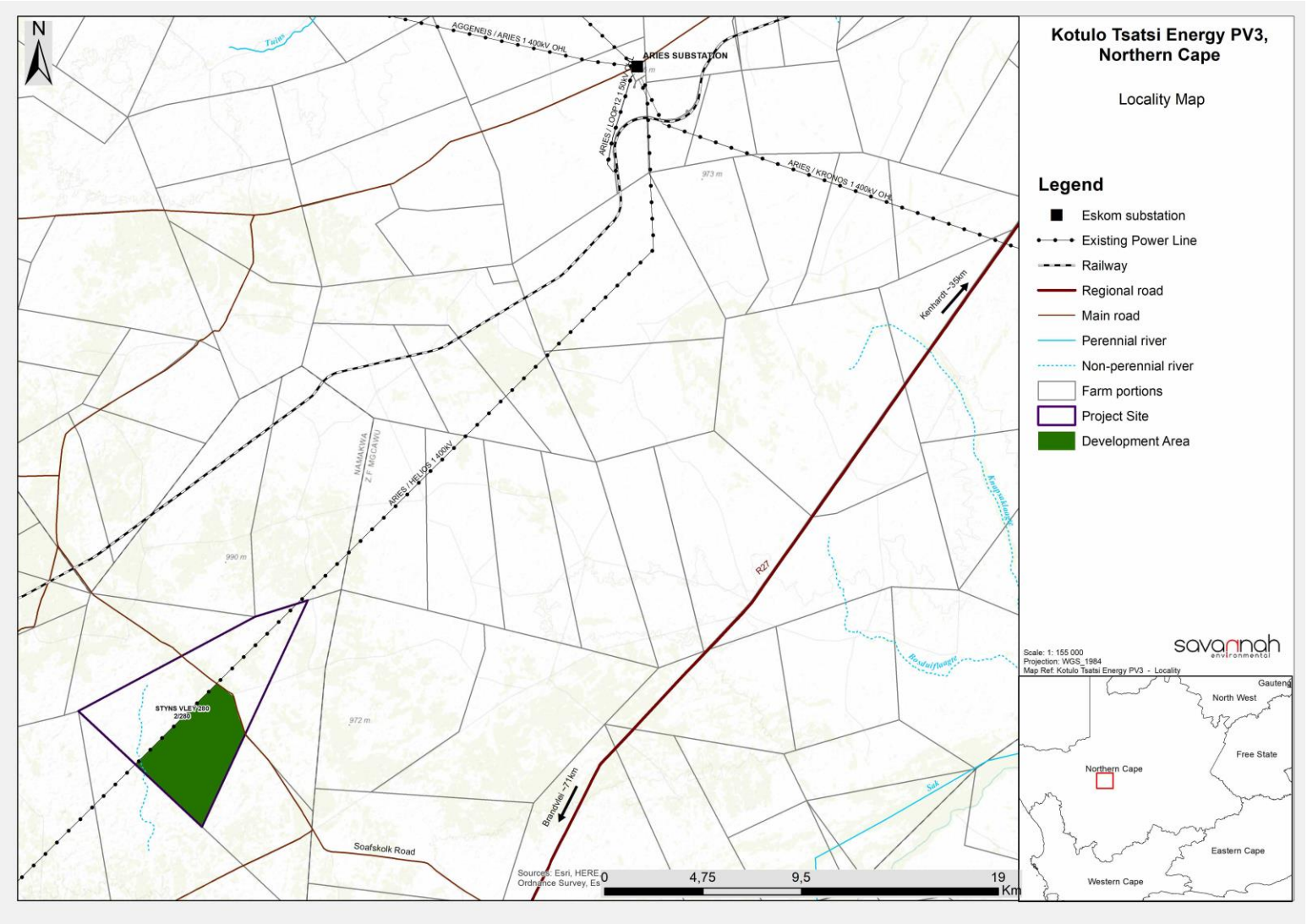

Figure 1.1: Locality map illustrating the location of the Kotulo Tsatsi Energy PV3 project site on Portion 2 of Farm Styns Vley 280 relative to the R27 and Soafskolk road, as well as the Aries Substation (refer to **Appendix D**)

1.1 Project Overview

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 2 of Farm Styns Vley 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure.

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 a BESS Energy Storage System (BESS), and associated infrastructure. During the Scoping Phase, the full extent of the project site[4] (i.e. approximately 4954ha) was considered, within which the development area[5] for the project (approximately 1888ha) 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.

Site-specific studies and assessments have delineated areas of potential sensitivity within the identified project site. In order to avoid these areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, the developer identified a suitable development footprint (approximately 1350ha in extent) within the development area within which the infrastructure for Kotulo Tsatsi Energy PV3 is proposed to be located. This development footprint has been defined and positioned based on sensitivities identified during the Scoping Phase. These include:

- Boesmanlandsevloere habitat
- Martial Eagle nest site 3km buffer
- The authorised Kotulo Tsatsi PV2 development footprint
- Ephemeral drainage features and habitats
- Pan features and habitats
- Critical biodiversity areas

The development footprint[6] has an extent of ~1350ha, and will include the 480MW PV facility, a BESS, and all associated infrastructure. 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 development area was previously authorised for the development of Concentrated Solar Power (CSP) technology (DEFF Ref.: 14/12/16/3/3/2/694), known as Kotulo Tsatsi Concentrated Solar Plant 2. However,

[4] The project site is the total area (farm portion) where the Kotulo Tsatsi Energy PV3 facility is planned to be located. This area include the already authorised Kotulo Tsatsi Energy PV1 (DFFE Ref.:14/12/16/3/3/2/2027); authorised Kotulo Tsatsi Energy PV2 (DFFE Ref.: 14/12/16/3/3/2/696) and authorised Kotulo Tsatsi Energy CSP3 (DFFE Ref.: 14/12/16/3/3/2/694). The project site is ~4954ha in extent.

[5] The development area is that identified area (located within the project site) where the Kotulo Tsatsi Energy PV3 facility is planned to be located. This area is a practicable option for the facility, considering technical preference and constraints. The development area is ~1888ha in extent.

[6] The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for Kotulo Tsatsi Energy PV3 is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

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.

PV technology is proposed to be utilised for the generation of electricity, and the Kotulo Tsatsi Energy PV3 facility will have a contracted capacity of up to 480MW. Infrastructure associated with the solar PV facility contracted capacity of up to 480MW will include:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- Access roads, internal distribution roads and fencing around the development area.
- Substation and BESS hubs, including:
  - Battery Energy Storage System (BESS)
  - On-site facility substations, switching substations
- 132kV power line within a 300m wide corridor to facilitate the connection between the PV Facility and the authorised 400kV collector substation.
- O&M and laydown area hub, including:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Laydown areas and temporary construction camp area.

»

The key infrastructure components proposed as part of the Kotulo Tsatsi Energy PV3 facility are described in greater detail in Chapter 2 of this EIA Report.

The overarching objective for the Kotulo Tsatsi Energy PV3 facility is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and 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 PV3 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 (~72km south)
Farm name(s) and number(s) of properties affected by: **Solar Facility** **On-Site facility Substations** **Power Line (300m corridor)**	Solar Facility and on-site facility substations: Portion 2 of Farm Styns Vley 280 Power Line (500m corridor): Portion 2 of Farm Styns Vley 280
Portion number(s) of properties affected by: **Solar Facility** **On-Site facility Substations** **Power Line (500m corridor)**	Solar Facility and on-site facility substations: Portion 2 of Farm Styns Vley 280 Power Line (500m corridor): Portion 2 of Farm Styns Vley 280

Province	**Northern Cape Province**		
SG 21 Digit Code (s)	Portion 2 of Farm Styns Vley 280: C03600000000002800002		
Current zoning	Agricultural (grazing of livestock)		
Site Coordinates (centre of affected property)	29°47'16.37"S ; 20°34'21.50"E		
Coordinates of the power line corridor	**Power Line:**		
	Point	**Latitude**	**Longitude**
	Start Point:	29°46'46.66"S	20°33'33.91"E
	Middle Point:	29°46'16.42"S	20°34'6.79"E
	End Point:	29°45'43.97"S	20°34'36.54"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 PV3 requires Environmental Authorisation (EA) from the National Department of Forestry, Fisheries and the Environment (DFFE) 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:

"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 DFFE 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 DFFE 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

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

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 has 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 PV3 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 PV3 has been included as **Figure 1.1** in this chapter.

This EIA Report consists of eleven chapters, which include:

- **Chapter 1** provides background to the Kotulo Tsatsi Energy PV3 project and the environmental impact assessment.
- **Chapter 2** provides a project description of the Kotulo Tsatsi Energy PV3 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 PV3.
- **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 considers 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 culminates in the submission of a final Scoping Report and Plan of Study for the EIA to the CA for consideration, acceptance The final Scoping Report and Plan of Study for the EIA for the Kotulo Tsatsi Energy PV3 project was submitted to the DFFE on 01 December 2022, and acceptance was received on 23 January 2023 therefore marking the start of the EIA Phase.
- 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.

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:

» **Nkhensani Masondo** is the EAP on this project is registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA (2020/1385) and holds a BSocSci in Environmental Analysis and Management. She has seven (7) years of working experience in the environmental field and has gained extensive experience in conducting Environmental Impact Assessments, Stakeholder Engagements, Environmental Auditing and Environmental Management Plans Programmes for a wide range of projects.

» **Karen Jodas** holds a Master of Science Degree from Rhodes University. She is registered as a Professional Natural Scientist (400106/99) with the South African Council for Natural Scientific Professions (SACNASP) and with the Environmental Assessment Practitioners Association of South Africa (EAPASA (2022/5499). 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.

»

» **Debbie-Lee Janse van Rensburg** holds a Bachelor of Arts and a BSc. Honours degree in Environmental Science. Her key focus is on undertaking environmental authorisation applications, environmental permitting, public participation, environmental impact assessments, and GIS mapping.

»

» **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**.

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 EIA Report.

CHAPTER 2 PROJECT DESCRIPTION

This Chapter provides a description of the proposed Kotulo Tsatsi Energy PV3 and associated infrastructure proposed for development. It must be noted that the project description presented in this Chapter may change to some extent based on the outcomes and recommendations of detailed engineering and other technical studies, the findings and recommendations of the EIA and supporting specialist studies, and 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
3(1)(b) the location of the activity including: (i) the 21-digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the proposed project is detailed in Chapter 1, **Table 1.1**, as well as in **Section 2.2.1**. The development area is located on Portion 2 of the Farm Styns Vley 280.
3(1)(c) a plan which locates the proposed activity or activities applied for at an appropriate scale.	A locality map is provided in **Chapter 1 Figure 1.1**
3(1)(d)(ii) a description of the scope of the proposed activity, including a description of the activities to be undertaken including associated structures and infrastructure	A description of the activities to be undertaken with the development of the project is included in **Table 2.1** and **Table 2.2**. A description of the associated infrastructure is included in **Section 2.5**. Activities to be undertaken during the various project development phases is included in **Section 2.6**.

2.2. Nature and Extent of the Kotulo Tsatsi Energy PV3 Facility

2.2.1 Overview of the Project Site and Planned Infrastructure

The project is to be developed on the Portion 2 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.

A technically feasible project site, with an extent of 4954ha has been identified by Kotulo Tsatsi Energy as a technically suitable area for the development of the Project. A development area[8] of ~1888ha was demarcated within this project site and allows an adequate footprint for the installation of a solar PV facility with a contracted capacity of up to 480MW, while allowing for the avoidance of environmental site sensitivities. A development footprint[9] of ~1350ha has been identified and assessed for the construction of the facility and its associated infrastructure. The optimal position for the PV facility was determined taking into consideration the environmental sensitivities identified through the Scoping Study. The PV infrastructure has been appropriately placed to optimise the energy generating potential of the solar resource while also minimising impacts on environmental sensitivities.

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 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 2 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 132kV grid connection solution to the authorised 400kV collector substation located on Portion 2 of Farm Styns Vley 280, and will comprise on-site switching substations, facility substations and a 132kV power line within a 300m wide corridor.

2.2.2 Components of the Solar PV Facility

Infrastructure associated with the solar PV facility contracted capacity of up to 480MW will include:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- Access roads, internal distribution roads and fencing around the development area.
- Two substation and BESS hubs, including:
  - Battery Energy Storage System (BESS)
  - On-site facility substations, switching substations
- 132kV power line within a 300m wide corridor to facilitate the connection between the PV Facility and the authorised 400kV collector substation.
- O&M and laydown area hub, including:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Laydown areas and temporary construction camp area.

[8] The development area is that identified area (located within the project site) where the Kotulo Tsatsi Energy PV3 facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~1888ha in extent.

[9] The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for Kotulo Tsatsi Energy PV3 is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in **Table 2.1.** The details and dimensions of the facility development footprint were assessed as part of the independent specialist studies undertaken as part of the EIA process. **Figure 2.1** illustrates the development footprint of the Kotulo Tsatsi Energy PV3 Facility assessed as part of this EIA report.

Table 2.1 provides the details of the Kotulo Tsatsi Energy PV3 facility, including the main infrastructure components and services that will be required during the project life cycle

Table 2.1: Details the Kotulo Tsatsi Energy PV3 Facility and associated infrastructure

Component	Description / Dimensions
Contracted capacity of the facility	480MW
Total extent of the Affected Properties, also referred to as the project site[10]	~4954ha
Total extent of the PV Development Area[11]	~1888ha
Total extent of the PV Development Footprint[12]	~1350ha
Technology	» Monofacial or Bifacial PV panels, mounted on either fixed-tilt, or single-axis tracking systems
PV panels	» Height: ~5m from ground level (installed).
Facility Substations	» Two on-site facility substations located on Portion 2 of the Farm Styns Vley 280 » Approximately 2ha in extent.
Switching Substations	» Two switching substations located within the development area on Portion 2 of the Farm Styn Vley 280 » Approximately 2ha in extent
Grid Connection	» A 300m wide grid connection corridor to the authorised 400kV substation within which the grid connection infrastructure will be constructed and operated. » Corridor traverses Portion 2 of the Farm Styns Vley 280 » Cabling connecting PV array to facility substation
Site and internal access	» The site is accessible via the Soafskolk access road. » Internal roads of up to 6m in width will be required to access the PV panels and the on-site substation.
Other infrastructure	» Laydown areas » Operations and Maintenance buildings » Control centre » Warehouse/ workshop

[10] The project site is that identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the EIA process, within which indirect and direct effects of the project may occur. The project site is ~4954ha in extent.

[11] The development area is that identified area where the 480MW PV facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~1888ha in extent.

[12] The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for the Kotulo Tsatsi Energy PV3 is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

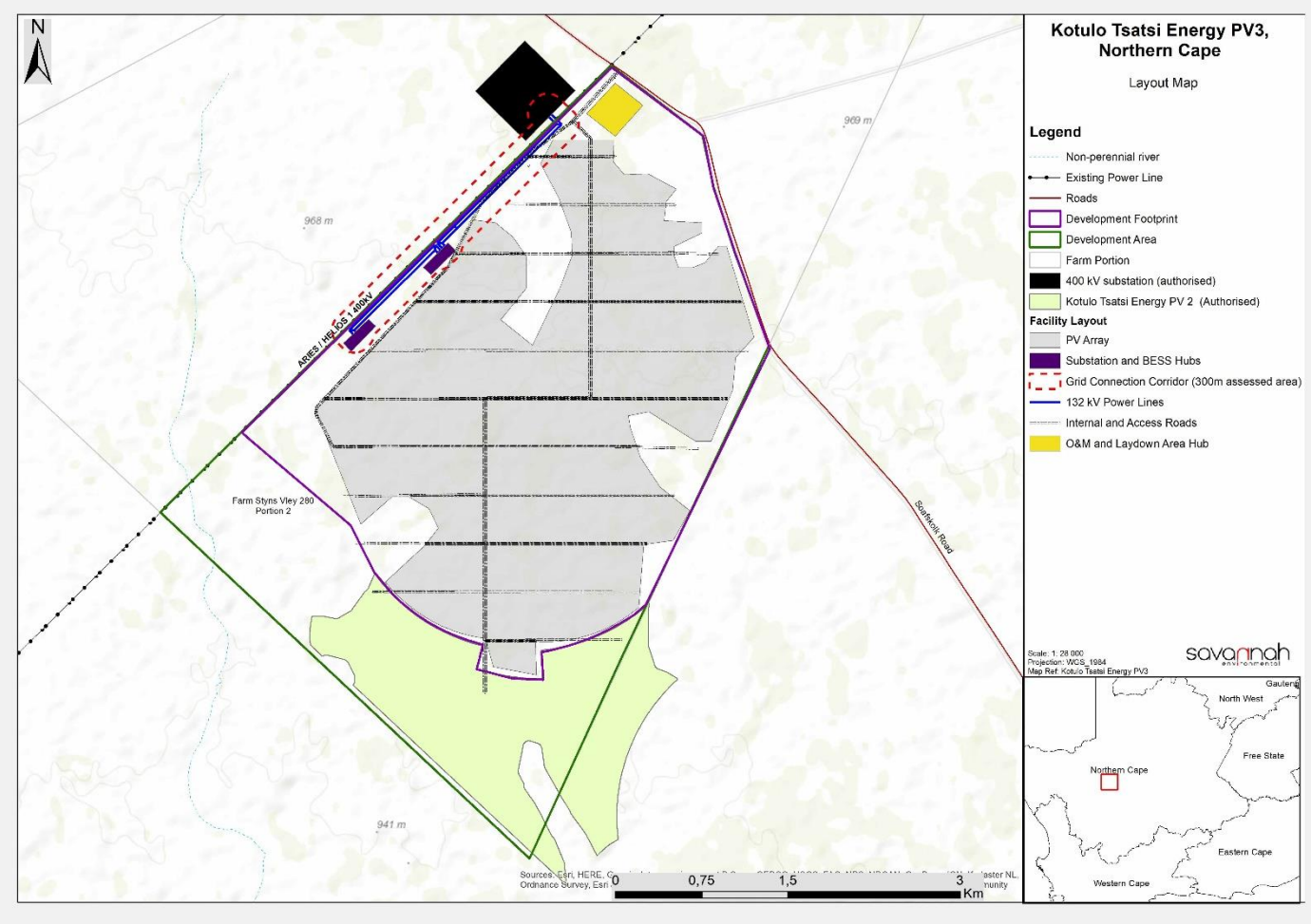

Figure 2.1: Development footprint (~1350ha) assessed within this EIA Report for the PV Facility

2.3. 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 (DFFE Ref.: 14/12/16/3/3/2/694) which contributes to the selection of the development area for the development of a solar PV energy facility. The development of the CSP project (known as Kotulo Tsatsi Concentrated Solar Plant 2) 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.

As 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 2 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 a 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).

Considering the above, the project site was identified and considered acceptable in terms of the investigations which have come before. The development area has been identified by the developer as a suitable area within which the solar PV facility can be placed from a technical perspective.

A development area has been sited within the project site through consideration and avoidance of already authorised development areas (Kotulo Tsatsi Energy PV1, PV2 and CSP3), and the environmental sensitivities identified during the EIA process of the Kotulo Tsatsi Concentrated Solar Plant 2, as well as the most recent Northern Cape Provincial conservation data (including conservation targets), such as Critical Biodiversity Areas and wetland features.

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 480MW solar PV development and associated infrastructure requires sufficient land space. The development area within which the project development footprint will be located, is ~1350ha. This area is considered to be sufficient for the planned 480MW 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.
- The project site is considerably larger than the area planned for the PV facility. The development area is approximately 1888ha (~37% of the total extent of the farm portion). The development footprint, which considers and avoids environmental sensitivities, is approximately 65% 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 PV3 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 PV3 will therefore not result in a reduction of the sustainability of the current land use and is considered to be appropriate. In addition, the proposed land use is in line with the planned surrounding changes to land use, that is, the authorised CSP3 facility to the west, authorised PV2 facility to the south, and the authorised PV1 facility to the west of the development footprint.

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 adjacent to the existing Aries-Helios 400kV power line and approximately 50km south-west from the Eskom Aries Substation. The solar PV facility will be connected to the grid via a grid connection solution, which consists of on-site facility and switching substations, and power line/s to facilitate the connection between the solar PV Facility and the authorised 400kV collector substation (at the CSP3 project site). These authorised components will also be used by Kotulo Tsatsi Energy PV3 to connect the project to the national grid.

A locality map illustrating the location of the project site, development area and authorised grid connection infrastructure is provided in **Figure 2.2**.

2.4. Technology considered for the Solar Energy Facility and the Generation of Electricity

Solar PV energy facilities 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 placing them into a higher state of energy to create electricity (refer to **Figure 2.3**).

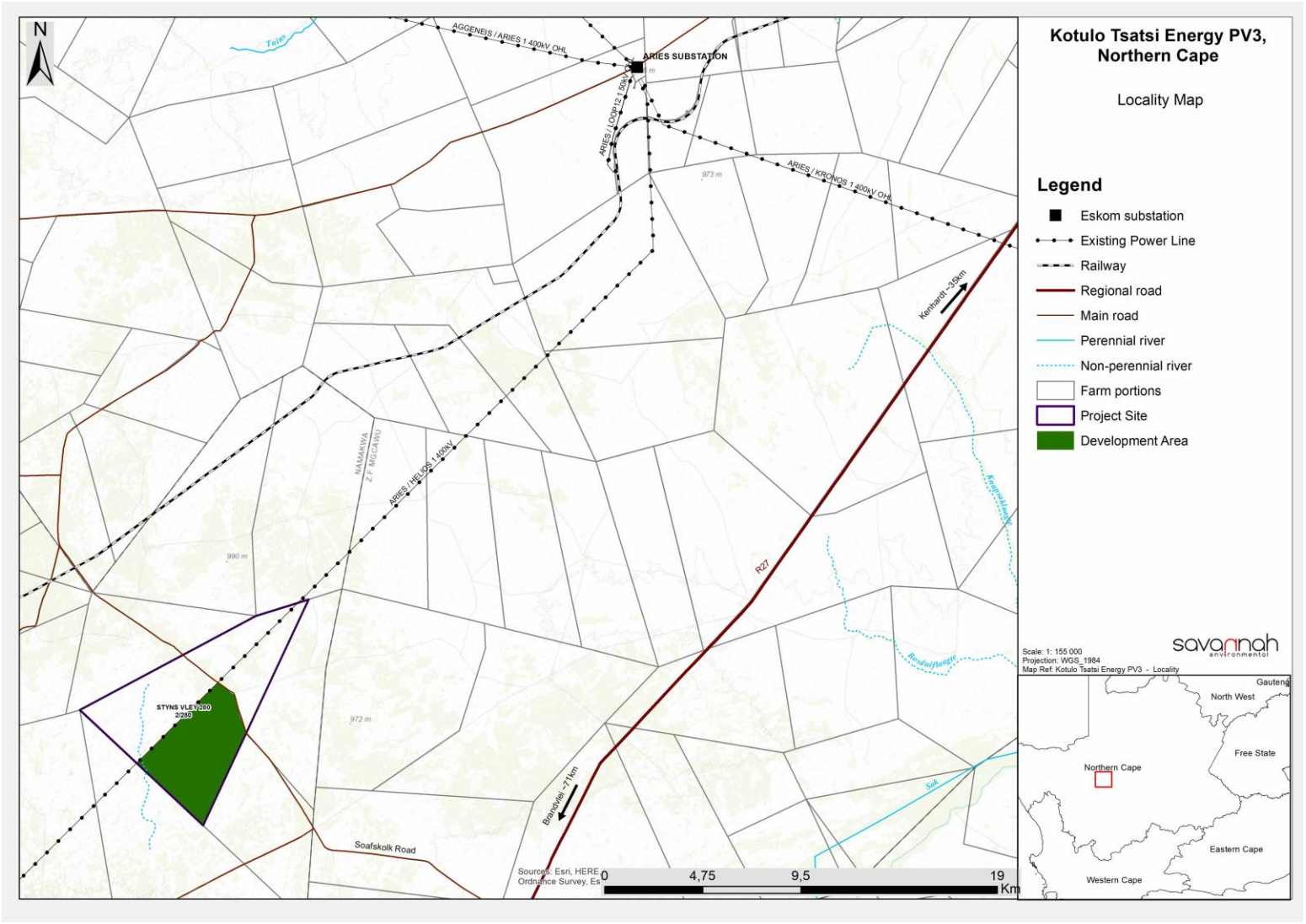

Figure 2.2: Map illustrating the development area within the project site, and the grid connection infrastructure considered for Kotulo Tsatsi Energy PV3.

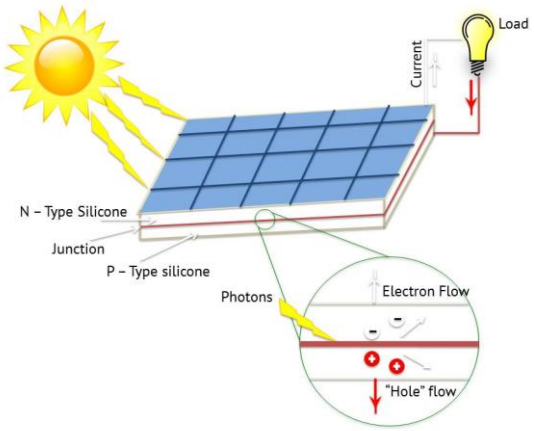

Figure 2.3: Diagram illustrating the Photovoltaic Effect (Source: Centre for Sustainable Energy)

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**). The PV cell is positively charged on one side and negatively charged on the other side and electrical conductors are attached to either side to form a circuit. This circuit then captures the released electrons in the form of an electric current (direct current). An inverter must be used to convert direct current (DC[13]) to alternating current (AC[14]). The electricity is then stepped up to a higher voltage via a transformer before being evacuated into the national grid via a power line.

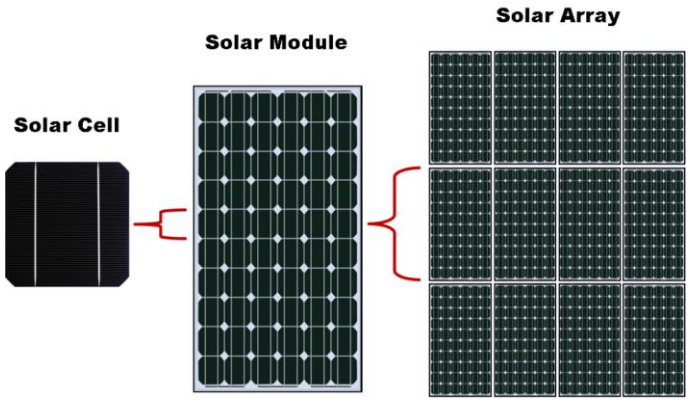

Figure 2.3: Overview of a PV cell, module and array / panel (Source: pveducation.com)

[13] 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).

[14] An alternating current (AC) occurs when charge carriers in a conductor or semiconductor and periodically reverse their direction of movement. The voltage of an AC power source can be easily changed by means of a power transformer. This allows the voltage to be stepped up (increased) for transmission and distribution (sourced from https://whatis.techtarget.com/definition/alternating-current-AC).

Bifacial Solar Panel Technology

The Applicant is considering the use of bifacial tracking technology. Bifacial ("two-faced") modules produce solar power from both sides of the panel. Traditional solar panels capture sunlight on one light-absorbing side. The light energy that cannot be captured is simply reflected away. Bifacial solar panels have solar cells on both sides, which enables the panels to absorb light from the back and the front (refer to **Figure 2.4**). In general, more power can be generated from bifacial modules for the same area, without having to increase the development footprint.

The optimum tilt for a bifacial module has to be designed so as to capture a big fraction of the reflected irradiation. Use of trackers is recommended so the modules can track the sun's movement across the sky, enabling them to stay directed to receive the maximum possible sunlight to generate power.

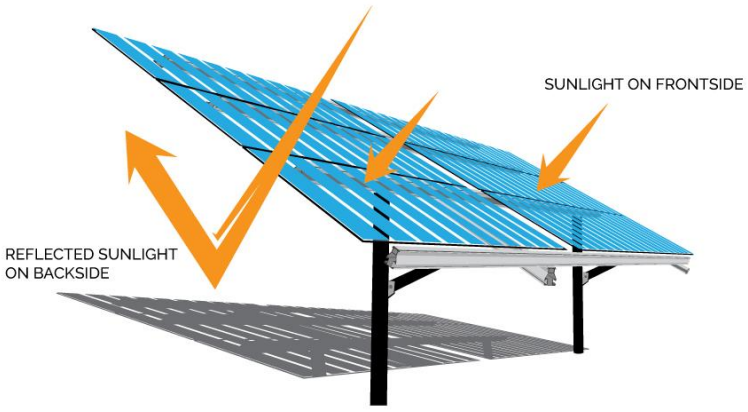

Figure 2.4: Diagram showing how bifacial Solar PV panels work (Source: https://sinovoltaics.com/learning-center/solar-cells/bifacial-solar-modules/)

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 2.5**). 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 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.

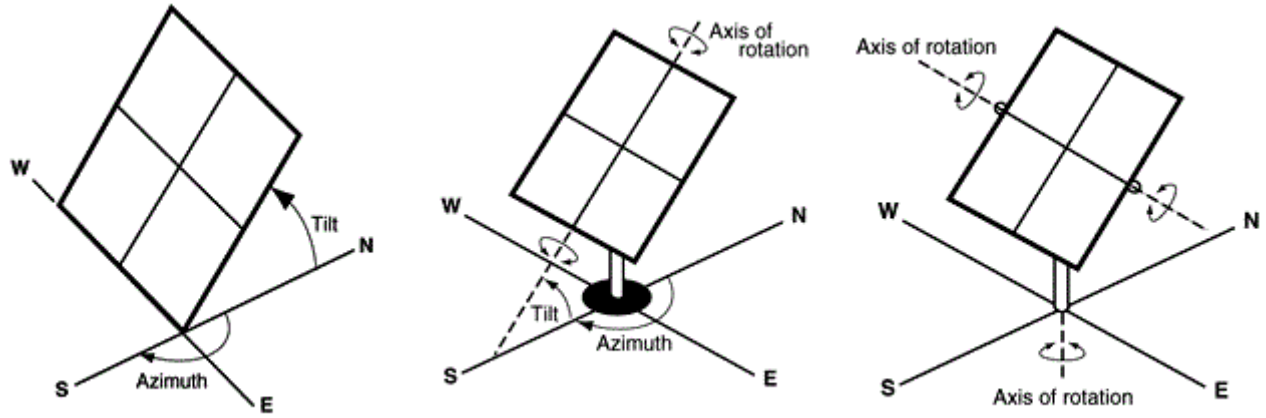

Figure 2.5: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

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

2.5. Description of the Associated Infrastructure

A summary of the planned infrastructure proposed as part of Kotulo Tsatsi Energy PV3 is provided in **Table 2.2**, and described in more detail under the sub-headings below.

Table 2.2: Planned infrastructure proposed as part of Kotulo Tsatsi Energy PV3

Infrastructure	Dimensions/ Details
Solar Facility	» 480MW photovoltaic (PV) technology utilising solar panels.
Supporting Infrastructure	» Inverters and transformers. » Cabling between the project components. » Access roads, internal distribution roads and fencing around the development area. » Two substations and BESS hubs, including: • Battery Energy Storage System (BESS) • On-site facility substations, switching substations » O&M and laydown area hub, including: • Site offices and maintenance buildings, including workshop areas for maintenance and storage. • Laydown areas and temporary construction camp area.
On-site substations	» On-site facility substations with a 132kV capacity.
Grid Connection	» A 132kV power line is required for grid connection.
Access road	» The construction of a new access road off of the Soafskolk Road, which traverses the northern boundary of the development area.
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

Infrastructure	Dimensions/ Details
	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 truck or via pipeline), or from groundwater abstraction. » 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.

2.5.1. Project Footprint

The development area has an extent of ~1888ha within which the development footprint will be placed. The layout design for the Kotulo Tsatsi Energy PV3 has been undertaken, and the extent of the development footprint has been determined to be ~1350ha. The development footprint will include solar PV array comprising PV modules and mounting modules, and associated infrastructure such as inverters and transformers, access roads, two substation and BESS hubs, and laydown and O&M hub. During construction, a temporary construction camp area will be required.

2.5.2. Details of the proposed project infrastructure

Kotulo Tsatsi Energy PV3 will be designed to have a contracted capacity of up to 480MW. The project will make use of fixed-tilt, single-axis tracking, and/or double-axis tracking PV technology. 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. If centralised inverter stations are used, Mega Volt (MV) distribution transformers are located internally, whereas string inverters are containerised with switchgear. The main transformer capacity varies according to detailed design and project-specific requirements.

2.5.3. Water Supply

Kotulo Tsatsi Energy PV3 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 operations, 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, ablutions, and canteen). 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, 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 truck or via pipeline) or groundwater abstraction.

2.5.4. Energy Storage

The general purpose and utilisation of the Battery Energy Storage System (BESS) 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 BESS 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 BESS 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 of generation from the 480MW solar energy facility. The BESS will be contained within insulated containers and will connect to the two on-site facility substations via underground cabling which will follow the internal access roads of the facility. **Figure 2.6** provides a general illustration of a BESS.

Figure 2.6: Example of battery storage units installed by Tesla (Source: fastcompany.com)

2.5.5. 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.

2.5.6. 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.

2.5.7. 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.

2.6. 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 PV3. These are discussed in more detail under the respective sub-headings below.

2.6.1. 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. The final facility design is required to be approved by the DFFE. Importantly, should there be any substantive changes or deviations from the original scope or layout of the project, the DFFE will need to be notified and where relevant, environmental approval obtained.

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.

2.6.2. 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 the proposed 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 PV3. 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)[15] 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.

Establishment of Laydown Areas on Site

[15] 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.

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 Construct Substation and Invertors

The construction phase involves installation of the solar PV panels, including the entire necessary structural and electrical infrastructure to make the plant operational. In addition, preparation of the soil and improvement of the access roads would continue for most of the construction phase. For array installation, typically vertical support posts are driven into the ground. Depending on the results of the Geotechnical Report, a different foundation method, such as screw pile, helical pile, micro-pile or drilled post/pile could be used. The posts will hold the support structures (tables) on which PV arrays would be mounted. Brackets attach the PV modules to the tables. Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared. While cables are being laid and combiner boxes are being installed, the PV tables are erected. Wire harnesses connect the PV modules to the electrical collection systems. Underground cables and overhead circuits connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure and ultimately the project's on-site facility substation.

The construction of an on-site facility substation would require a survey of the site, site clearing and levelling, construction of access road/s (where required), construction of a level terrace and foundations, assembly, erection, installation and connection of equipment, rehabilitation of any disturbed areas and protection of erosion sensitive areas.

Figure 2.7: Photographs illustrating frame structural details

Establishment of Ancillary Infrastructure

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 PV3, any access points which are not required during operation must be closed and rehabilitated accordingly.

2.6.3. Operation Phase

Kotulo Tsatsi Energy PV3 is expected to operate for a minimum of 25 years. The facility will operate continuously, 7 days a week, and will include battery storage. 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.

2.6.4. Decommissioning Phase

Depending on the continued economic viability of Kotulo Tsatsi Energy PV3 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.

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for Kotulo Tsatsi Energy PV3 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
3(1)(h)(i) details of the development alternatives considered.	The details of all alternatives considered as part of the Kotulo Tsatsi Energy PV3 are included in **section 3.2**.1 – 3.2.4
3(1)(h)(ix) if no alternative development footprint for the activity were investigated, the motivation for not considering such.	The site selection process followed by the Applicant in order to identify the preferred project site and development footprint is described in **Section 3.2.1**.
3(1)(h)(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	Where no alternatives have been considered, motivation has been included. This is 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 PV3 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 DFFE Guideline for determining alternatives states that the key criteria for consideration when identifying alternatives are that they should be "practicable", "feasible", "relevant", "reasonable" and "viable". Essentially there are two types of alternatives:

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

In this instance, 'the project' refers to Kotulo Tsatsi Energy PV3, a solar PV facility with capacity of up to 480MW$_{AC}$ and associated infrastructure proposed to be developed by an Independent Power Producer

(IPP) and intended to form part of the DMRE's REIPPP Programme or other public or private off-taker programmes.

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)[16], 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. Of relevance to the proposed project is the IRP 2019 which outlines South Africa's stepping stones to reduce coal's contribution to the energy mix to below 60%, in favour of renewables like wind, and PV technologies, which would account for 25% of the country's energy mix by 2030, furthermore the DMRE plans to repurpose existing coal-fired plants with renewable energy plants and/or battery storage solutions, and training people in new skills to ensure that jobs can be transferred.

The fundamental energy generation alternatives were assessed and considered within the development of the IRP and the need for the development of renewable energy projects has been defined. 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. <u>Property or Location Alternatives</u>

Previously, one solar PV and three CSP facilities were authorised within the study area, which included the farm Portion 2 of Farm Styns Vley 280. As a result of the affected property being previously authorised for a

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

development of a similar nature, the suitability of the land for the development of solar PV facilities has, therefore, been confirmed.

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 placed within the study 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 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 9 years. Based on the solar resource available, no alternative locations are considered.

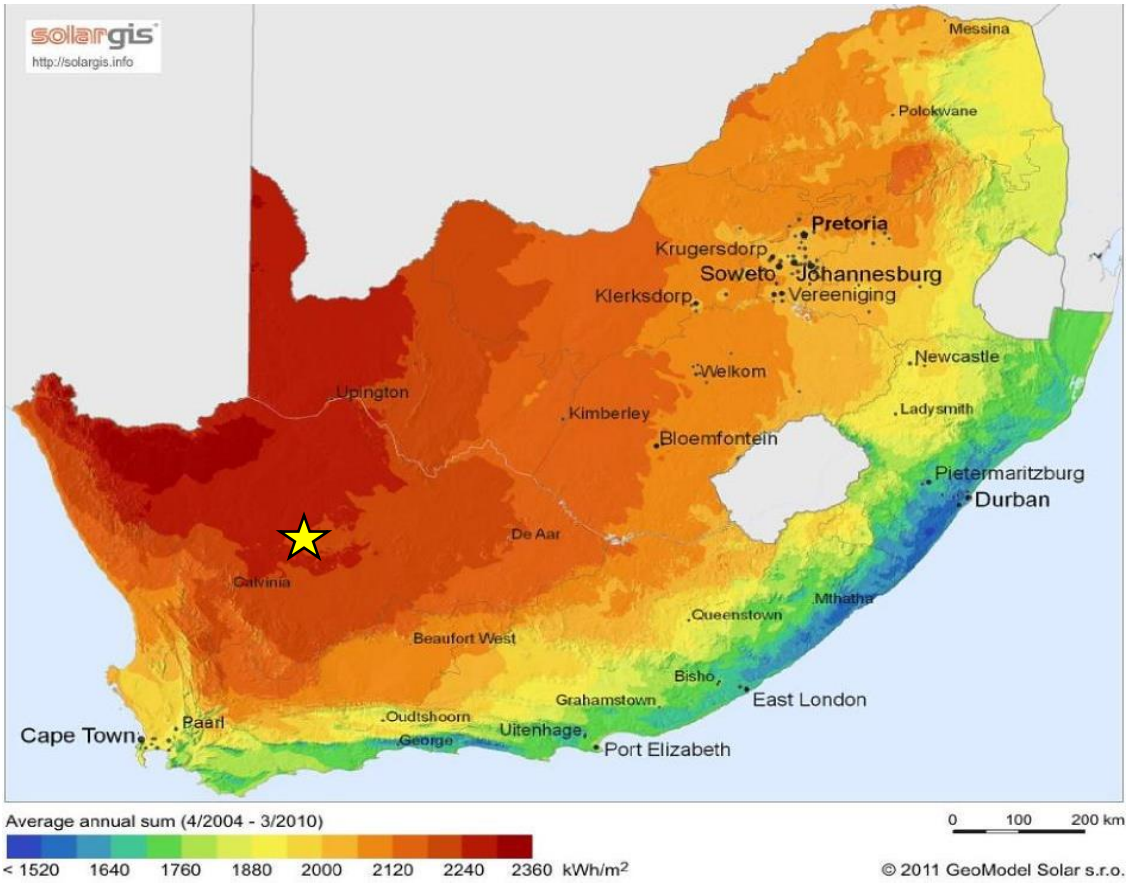

Figure 3.1: Solar irradiation map for South Africa. The approximate location of the Kotulo Tsatsi Energy PV3 site is indicated by the yellow star. (Source: adapted from GeoModel Solar, 2011)

» **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 2 of Farm Styns Vley 280) is approximately 4954ha in extent, which is sufficient for the installation of a solar PV facility with a contracted capacity of up to 480MW$_{AC}$, while allowing for the avoidance of environmental site sensitivities. A development area of ~1888ha has been identified within the project site within which the solar PV facility will be located. The development footprint (within which the Kotulo Tsatsi Energy PV3 PV array plus associated infrastructure) has been demarcated as an area of ~1350ha, which is equivalent to 65% 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.

» **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 grid line can connect directly into the authorised 400kV substation on the adjacent site, or via the Aries Substation located north-east of the development area.

» **Geographic location**: The proposed project site is located within an area which has become a node for renewable energy projects, with both PV and CSP solar facilities authorised on and/or 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 as well as a landowners consent as per the requirements of the EIA Regulations, 2014. 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 Applicant considers the development area located within the project site as highly preferred in terms of the development of a solar PV facility and expects that Kotulo Tsatsi Energy PV3 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 overall aim of the facility layout (i.e., development footprint) is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operation, and maintenance costs, and social and environmental impacts. The suitability of the site from an environmental perspective for the placement of the Kotulo Tsatsi Energy PV3 facility in the area will be determined through the EIA process being undertaken for the facility. The findings of the specialist assessments will assist the applicant in selecting the optimum position for the PV arrays and associated infrastructures including, but not limited to, access roads, and laydown areas.

The affected property (i.e., Portion 2 of Farm Styns Vley 280) is approximately 4954ha in extent, which is sufficient for the installation of a solar PV facility with a contracted capacity of up to 480MW while allowing the avoidance of environmental site sensitivities. The 200MW Kotulo Tsatsi Energy PV2 (DFFE ref.: 14/12/16/3/3/2/696) which is approximately 315ha in extent is also located on the affected property. A development area of ~1888ha has been identified within the project site within which the solar PV facility will be located. The development footprint (within which the Kotulo Tsatsi Energy PV3 PV array plus associated infrastructure) has been demarcated as an area of ~1350ha, which is equivalent to 72% 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 provide site specific information regarding the development area and development footprint considered for the Kotulo Tsatsi Energy PV3.

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 footprint of the PV facility (~1350ha) within the development area (1888ha). 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 the most 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 PV3 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 PV3. 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 remains 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 PV3 at the identified site in the Northern Cape Province. 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, 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 'do-nothing alternative has been assessed as part of the EIA Phase (refer to **Chapter 8** and **Chapter 10** of this EIA Report).

3.3 Conclusion

The Applicant considers the preferred development footprint as being highly favourable and suitable for the establishment of a solar PV facility. The PV facility will be located within close proximity of the authorised Kotulo Tsatsi Energy PV2 facility. The proposed site was previously used for agricultural activities (livestock grazing). Furthermore, with the site being near the authorised 400kV Substation, this ensures that the power line will be relatively short, saving on costs and further reducing cumulative environmental impacts associated with power line infrastructure. The characteristics considered were identified by the Applicant as the main aspects that play a role in the opportunities and limitations for the development of a Solar PV facility.

CHAPTER 4: POLICY AND LEGISLATIVE CONTEXT

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

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
3(1)(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 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 PV3 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 PV3.

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.

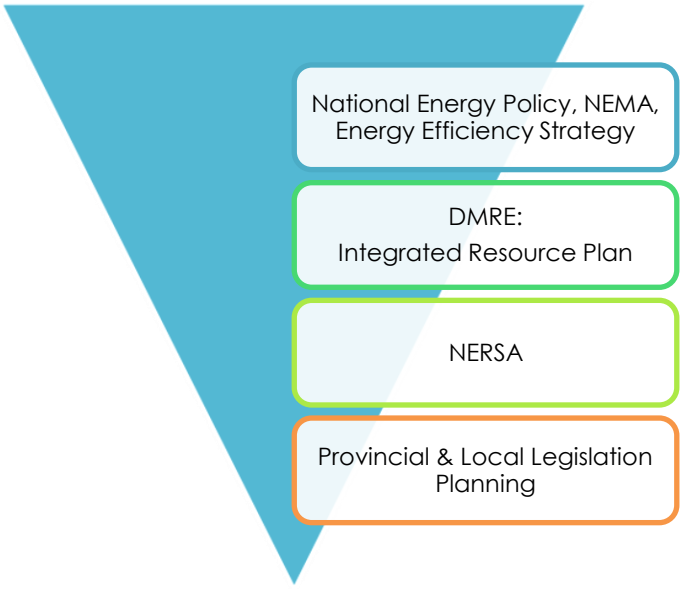

Figure 4.1: Hierarchy of electricity and planning documents

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 Forestry, Fisheries and the Environment (DFFE):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GN R326), as amended. DFFE is the Competent Authority for this project (as per GN R779 of 01 July 2016) and is charged with granting the EA for the project under consideration. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).
- **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e., Water Use Licenses (WUL) and General Authorisation).
- **The Department of Agriculture, Land Reform and Rural Development (DALRRD):** 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.

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

» **Provincial Government of the Northern Cape – Northern Cape Department of Environment and Nature Conservation (DENC):** 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 Policy and planning on an International Level

South Africa has committed to various international policies which relate to environmental concerns, specifically that of climate change and global warming. Table 4.1 below provides a summary of the international policies and plans that South Africa has made commitments towards, and how the proposed development of the Kotulo Tsatsi Energy PV3 facility aligns with the thinking or commitments of these agreements. The Kotulo Tsatsi Energy PV3 Facility is considered to be aligned with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.1: International policies relevant to Kotulo Tsatsi Energy PV3

Policy or Plan	Is the development of the San Solar PV facility aligned with this policy or plan?
The Kyoto Protocol, 1997	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 San Solar PV facility will enable the evacuation of additional capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements as set out in the protocol.
United Nations Framework Convention on Climate Change and COP21 – Paris Agreement	South Africa supports the adoption of the Paris Agreement which has the main objective of addressing the climate change issue and marks the first international political response to climate change. South Africa has set out a goal of 17GW of renewable energy by 2030 within the IRP of 2019. Through the development of renewable energy projects (including San Solar PV facility) additional renewable energy will be made available to the country, which in turn will demonstrate the contribution that South Africa is making to the global response to climate change specifically relating to the development of the renewable energy sector.
The Equator Principles 4 (October 2020)	The Equator Principles (EPs) III 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

Policy or Plan	Is the development of the San Solar PV facility aligned with this policy or plan?
	(such as Kotulo Tsatsi Energy PV3) 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 PV3. 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 PV3 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 on 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. The overall objectives of the IFC performance standards are to fight poverty, do no harm to people or the environment, fight climate change by promoting low carbon development, respect human rights, promote gender equality, provide information prior to project development, collaborate with the project developer in order to achieve the performance standard, provide advisory services and notify countries of trans boundary impacts. 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 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 PV3, 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.

4.4 Policy and planning on a National Level

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 4742MW operational and made available to the grid. 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.

A brief review of the most relevant national policies is provided below in **Table 4.2**. The development of Kotulo Tsatsi Energy PV3 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 national legislation and policies for Kotulo Tsatsi Energy PV3

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
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. The undertaking of an EIA process for the proposed project in terms of the requirements of the EIA Regulations, 2014 (as amended) aims to minimise any impacts on the natural and social environment.
National Environmental Management Act (No. 107 of 1998) (NEMA)	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	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

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
(2003)	aims to create the necessary conditions for the development and commercial implementation of RE technologies. 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

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
	for public comment. The lengthy public participation and consultation process has culminated in the issue of the overdue IRP 2019 which updates the energy forecast from the current period to the year 2030. 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 PV3 is supported by the IRP 2019.
Renewable Energy Policy in South Africa	Support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable energy resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. However, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been largely neglected in South Africa. Challenges regarding the implementation of renewable energy have been identified. Through the development of renewable energy projects (including the Kotulo Tsatsi Energy PV3), additional renewable energy will be made available which will assist with the further growth and development of the renewable energy sector.
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

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
	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 PV3 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 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 PV3 is aligned with SIP 8 as it constitutes a green energy initiative that would contribute clean energy in accordance with the IRP 2010 – 2030.
New Growth Path (NGP) Framework, 2010	The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs through the green economy. With economic growth and employment creation as the key indicators identified in the NGP. To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas. The Kotulo Tsatsi Energy PV3 will assist with the creation of both temporary and permanent employment opportunities during the construction and operation phases, which will contribute, albeit to a limited extent, to the economy and sustainable growth.
National Climate Change Response 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

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
	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 PV3, 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. Kotulo Tsatsi Energy PV3 consists of a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

4.5 Policy and planning at a Provincial Level

A brief review of the most relevant provincial policies is provided below in **Table 4.3**. The development is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.3: Relevant provincial legislation and policies for Kotulo Tsatsi Energy PV3

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
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.

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
	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 PV3 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. The development of Kotulo Tsatsi Energy PV3 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 PV3 will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape.
Northern Cape Province Green Document	The NCP Green Document (2017-2018) was prepared by the Northern Cape Department of Economic Development and Tourism and provides an impact assessment of IPPs on the communities in the province located within a 50km radius from existing facilities. The document notes that the NCP is nationally a leader in commercial-scale renewable energy

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
	projects. By 2018, a total of 23 IPP projects in the province had been integrated into the national grid. These projects include Solar PV, Concentrated Solar, and Wind Energy Facilities. The document notes that through their economic development obligations, these projects have already made a significant positive contribution to affected communities. Much of the effort has been directed at supporting local education. The document also notes that, as these projects are committed to 20-year minimum lifespans, they collectively hold a tremendous potential for socio-economic upliftment. The development of the Kotulo Tsaatsi Energy PV3 will contribute towards further socio-economic upliftment in the Northern Cape Province.

4.6 Policy and planning at a Local Level

The local tiers of government relevant to the Kotulo Tsatsi Energy PV3 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 PV3. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 4.6: Relevant district and local legislation and policies for Kotulo Tsatsi Energy PV3

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
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; » Municipal financial viability and management; and » Good governance and public participation. The development goals listed in the IDP that are relevant to the development of Kotulo Tsatsi Energy PV3 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; and » 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 PV3: » Promotion of SMMEs in order to strengthen the Local Economic Sector; and » Promote the infrastructure development, including electricity.
Hantam Local Municipality Integrated Development	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

Relevant legislation or policy	Relevance to Kotulo Tsatsi Energy PV3
Plan (IDP) 2020/2021 (Final, May 2020)	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 PV3 is desirable by the local municipality due to the alignment with the IDP.

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. The need and desirability of a proposed development is, therefore, associated with the wise use of land, and should be able to respond to the question such as, but not limited to, what the most sustainable use of the land may be.

This Chapter provides an overview of the suitability of Kotulo Tsatsi Energy PV3 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
3(1)(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 identification and motivation for the preferred project site, the development area within the project site, the proposed activity and the proposed technology is included in **Sections 5.2 to 5.4.**

5.2 Need and Desirability from an International Perspective

The need and desirability of Kotulo Tsatsi Energy PV3, 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.
7.2 By 2030, increase substantially the share of	7.2.1 Renewable energy share in the total final energy

Targets		Indicators	
	renewable energy in the global energy mix.		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 PV3 would contribute positively towards Goal 7 of the SDGs through the following:

- By generating up to 480MW_{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.

5.3 Need and Desirability from a National Perspective

Kotulo Tsatsi Energy PV3 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 PV3 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 provides the necessary framework within which energy generation projects can be developed:

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

The above-mentioned 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:

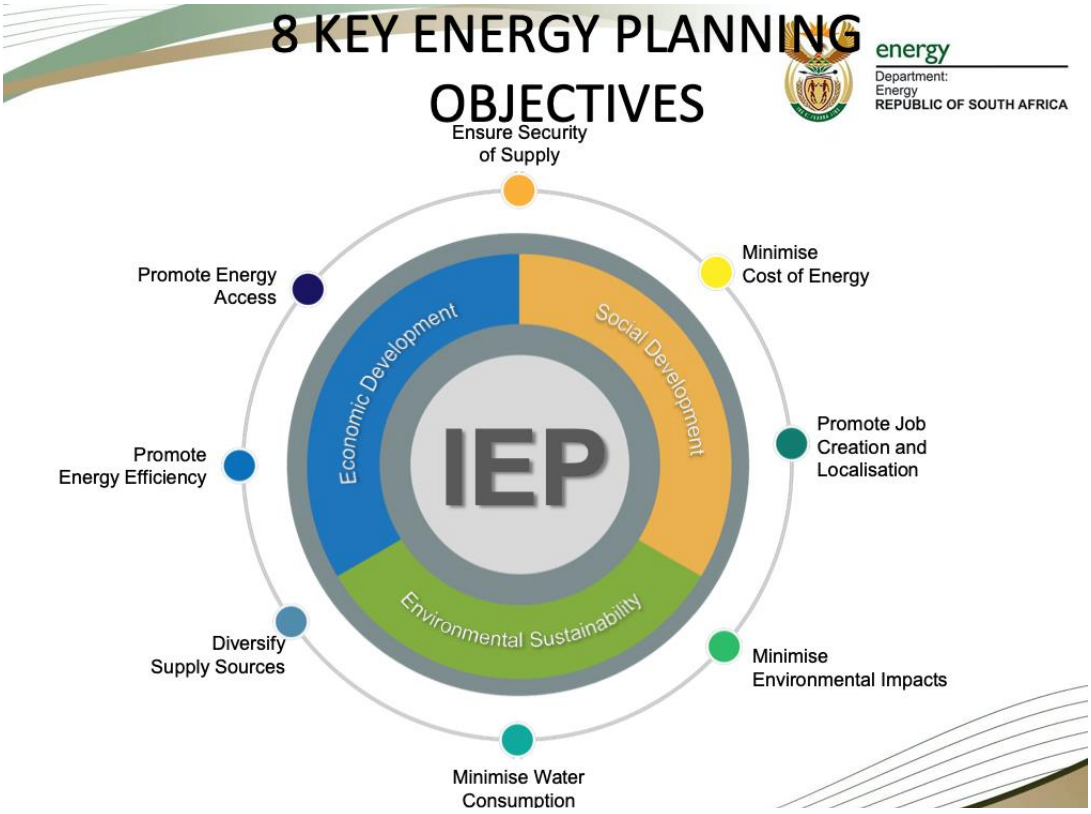

Figure 5.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

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. The project will assist with the objective to generate electricity by means of renewable energy to feed into the national grid which will be procured under either the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), other government run procurement programmes; or for sale to private entities (private PPAs). 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[17] 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 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 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.

[17] 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

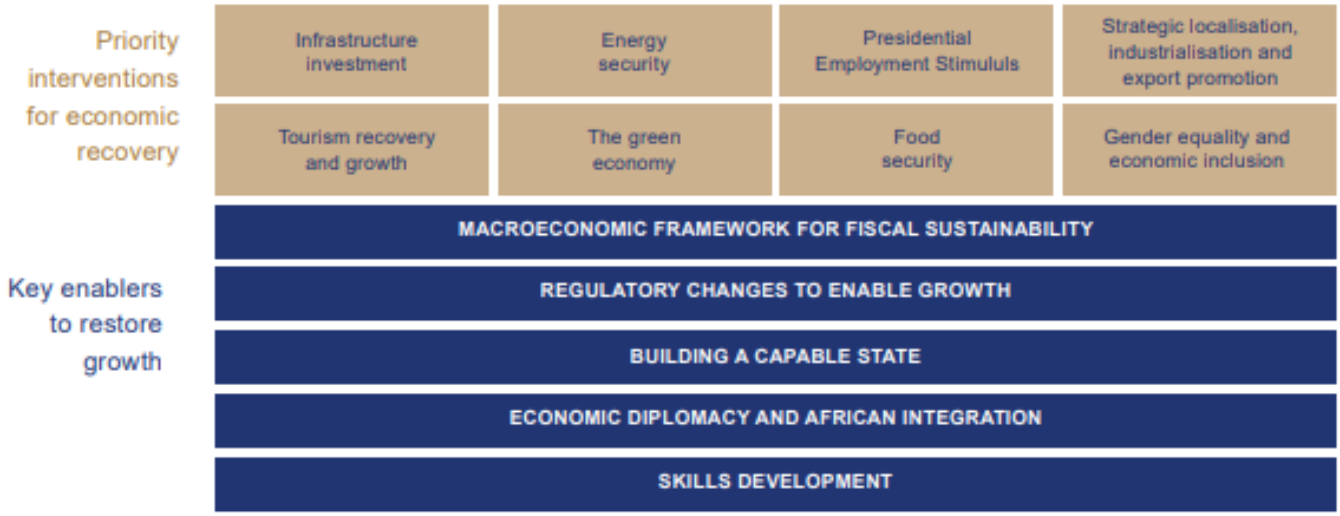

Figure 5.2: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

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 the Kotulo Tsatsi Energy PV3 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 PV3 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 PV3 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 PV3 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 (**Figure 5.3**) of coal power is expected to be decommissioned in the period 2030 to 2050. 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 (Decommis-sioning)	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 5.3: 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/m²/annum, equivalent to the highest GHI values in the country (refer to **Figure 5.4**).

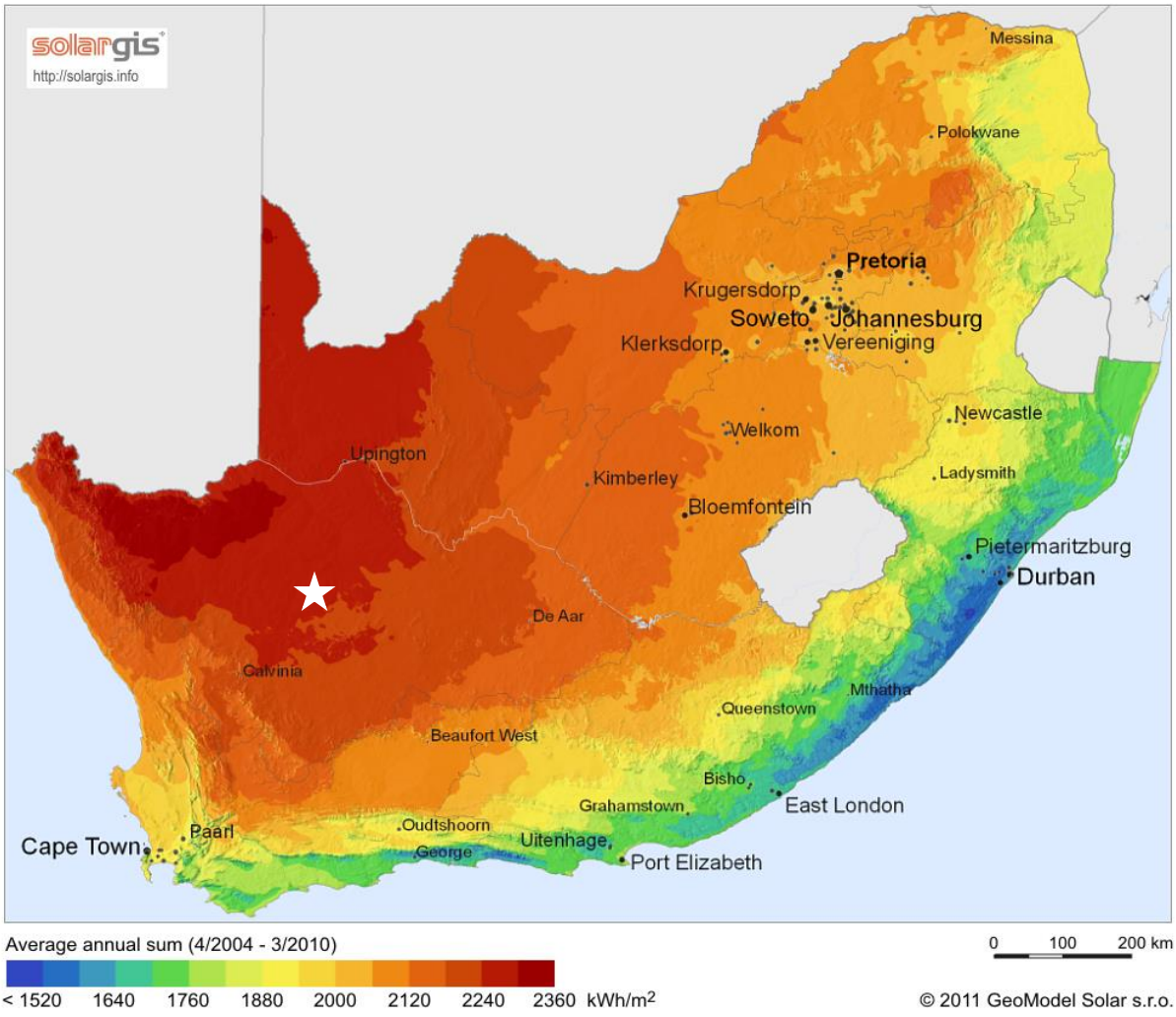

Figure 5.4: Solar irradiation map for South Africa, with the position of Kotulo Tsatsi Energy PV3 shown by the white star (Source: GeoModel Solar)

5.5 Receptiveness of the proposed development area for the establishment of Kotulo Tsatsi Energy PV3

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 PV3 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 PV3.

- **Site extent and land availability:** Availability of relatively level land of sufficient extent can be a restraining factor to solar facility development, as a 480MW PV facility and associated infrastructure requires ~1000ha of land space (at a ratio of 2ha/installed MW). A development area of ~1888ha has been identified, which is sufficient for the development of a solar PV facility with a contracted capacity of up to 480MW, while allowing for the avoidance of environmental sensitivities; and within which the solar PV facility will be sited. The development footprint (within which the Kotulo Tsatsi Energy PV3 PV array plus associated infrastructure will be placed) has been demarcated as an area of ~1350ha, which is equivalent to 72% of the extent of the development area. The extent of land available for the construction and operation of Kotulo Tsatsi Energy PV3, and the opportunity provided for the avoidance of environmental sensitivities contributes to the need and desirability of the development of Kotulo Tsatsi Energy PV3 in the proposed location. Furthermore, taking into consideration that the authorised Kotulo Tsatsi PV1 solar PV facility, authorised Kotulo Tsatsi PV2 solar PV facility as well as Kotulo Tsatsi Energy CSP3 is located within the same project site and directly to the south, west and east of the Kotulo Tsatsi Energy PV3 development area, also adds to the desirability of the proposed development in the proposed location.

- **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 5.5**) 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 PV3, 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 5.5: Existing road infrastructure within the vicinity of the development area for Kotulo Tsatsi Energy PV3. 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 PV3 will be authorised 400kV collector substation located north west of the development area on Portion 2 of the Farm Styns Vley 280.

» **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 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 DFFE. The proposed development is compatible with the surrounding land uses and does not present a conflicting 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 option to lease agreement with the Applicant.

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 PV3 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 PV3 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 in the South African Context

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 PV3 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 PV3 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[18]. 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.

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 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.

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

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[19] of 25.3 million tonnes of CO_2 (IPP Office, March 2018). The development of Kotulo Tsatsi Energy PV3, 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[20].

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

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

Protecting the natural foundations of life for future generations: Actions to reduce our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change, thereby securing the natural foundations of life for generations to come; this is the basis of sustainable development. 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 PV3 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 480MW and Activity 1 of Listing Notice 2 (GNR 325) is triggered.

[19] 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.

[20] https://www.sanews.gov.za/south-africa/renewable-energy-programme-attracts-r2094-billion-sa-economy

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, and is illustrated in **Figure 6.1.** Public Participation forms an important component of the process and is undertaken throughout both phases.

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

The Scoping Phase of the EIA process aimed at identifying and describing potential issues associated with the proposed project and defining the extent of studies required within the EIA Phase. This was achieved through an evaluation of the proposed project involving desktop specialist inputs, as well as a consultation process with the Interested and Affected Parties (I&APs), including the decision-making authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant organs of state departments, ward councillors and other key stakeholders. This chapter serves to outline the process followed during the S&EIA process to date.

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
3(1)(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 and applied for are included in **Section 6.2**.
(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The public participation process followed throughout the EIA process of Kotulo Tsatsi Energy PV3 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 have been included and responded to in the Comments and Responses (C&R) Report (**Appendix C8**).
(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 associated with the alternatives are included in **Section 6.5.3**.

6.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to Kotulo Tsatsi Energy PV3, 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 PV3 is a power generation project and therefore relates to the IRP for Electricity 2010 – 2030, the National Department of Forestry, Fisheries and the Environment (DFFE) has been determined as the Competent Authority (CA) in terms of GNR 779 of 01 July 2016. The Provincial Northern Cape Department of Environment and Nature Conservation (NCDENC) 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 EA.

The EIA process being conducted for Kotulo Tsatsi Energy PV3 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 PV3, 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)	11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV or more. ***The project entails the construction of a new 132kV power line within a 300m corridor to facilitate the connection between the PV Facility and the authorised 400kV collector substation. The power line and on-site substations will have a capacity of 132kV and will be located outside of an urban area.***
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- (c) within 32 metres of a watercourse. ***The construction and operation of the solar PV facility and associated infrastructure will occur within 32m of an ephemeral drainage line located within the development area. 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.***
Listing Notice 1	19 (ii)	The infilling or depositing of any material of more than 10 cubic meters

Notice Number	Activity Number	Description of listed activity
(GNR 327) 08 December 2014 (as amended)		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 (i)watercourse. ***The development area is directly adjacent to a watercourse and will require the removal of >10 cubic metres of soil and rock from the watercourse during the construction phase of infrastructure, including access roads.***
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 agricultural purposes. The total extent of the development envelope is ~1350ha.***
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 480MW. 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[21]. ***The facility is located on agricultural land where the predominant land use is livestock grazing and is therefore likely to comprise indigenous vegetation. The project would therefore result in the clearance of an area of land greater than 20ha of indigenous vegetation. The total extent of the development area is ~1350ha.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	4(a)(i)=ee)	The development of a road wider than 4 metres with a reserve less than 13,5 meters, (g) in the Northern Cape, (ii) outside urban areas; (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***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. The***

[21] "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.

Notice Number	Activity Number	Description of listed activity
		development area is located outside of any urban areas and contains areas identified as CBA1 as per the Namakwa Bioregional Plan Draft 1, published in 2010 by the Namakwa District Municipality.
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	10(g)(ii) & (iii)(ee)	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters, (g) in the Northern Cape, (ii) in areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland and (iii) outside urban areas and (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***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. The construction and operation of the solar PV facility and associated infrastructure will occur within 32m of an ephemeral drainage line located within the development area . The development area contains areas identified as CBA1 as per the Namakwa Bioregional Plan Draft 1, published in 2010 by the Namakwa District Municipality.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	12(g)(ii)	The clearance of an area of 300 square meters or more of indigenous vegetation, (g) in the Northern Cape, (ii) within critical biodiversity areas identified in bioregional plans. ***The project would result in the clearance of an area of land greater than 20ha of indigenous vegetation. The development area contains areas identified as CBA1 as per the Namakwa Bioregional Plan Draft 1, published in 2010 by the Namakwa District Municipality.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	14(ii)(a)(c)(g)(ii)(ff)	The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs (a) within a watercourse, or (c) within 32 meters of a watercourse, measured from the edge of a watercourse, in (g) the Northern Cape, (ii) outside urban areas, (ff) within critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The construction and operation of the solar PV facility and associated infrastructure will occur within 32m of an ephemeral drainage line located within the development area. The infrastructure will have a physical footprint of more than 10 square metres. The development area contains areas identified as CBA1 as per the Namakwa Bioregional Plan Draft 1, published in 2010 by the Namakwa District Municipality.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	18(g)(ii)(ee)(ii)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre, (g) in the Northern Cape, (ii) outside urban areas, within (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans, and within (ii) a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.

Notice Number	Activity Number	Description of listed activity
		The Soafskolk Road may need to be widened by more than 4m for the construction phase of the PV facility. The development area contains areas identified as CBA1 as per the Namakwa Bioregional Plan Draft 1, published in 2010 by the Namakwa District Municipality.

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 Water and Sanitation (DWS) 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.

In terms of the NFEPA (2011) and the NBAs 2018 National Wetlands Map, two (2) watercourse features are located within the extent of the larger project area. Areas classified as watercourses will therefore be assessed in terms of the DWS regulations to determine if the development footprint will fall within any regulated areas such as the 500m wetland buffer.

Table 6.2 contains 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 PV3 will be located within the GN509 regulated area of a watercourse (100m zone surrounding the identified ephemeral drainage line).***
NWA (No. 36 of 1998)	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***Infrastructure associated with Kotulo Tsatsi Energy PV3 will be located within the GN509 regulated area of a watercourse (100m zone surrounding the identified ephemeral drainage line).***

Due to the development area of Kotulo Tsatsi Energy PV3 being located within the regulated area of an ephemeral watercourse, 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 PV3 will 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 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

This 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 broader project site was considered during the Scoping Study for the 480MW PV facility to identify and delineate any environmental fatal flaws, "no-go" or sensitive areas which should be avoided. This was undertaken through specialist studies and process of consultation. 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 DFFE on 01 December 2022, and acceptance was received on 23 January 2023, marking the start of the EIA Phase (refer to **Appendix B**).

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 location for the activity within the development footprint 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. 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 will continue throughout the EIA process. In terms of GNR 779 of 1 July 2016, the National DFFE has been determined as the competent authority for all projects which relate to the IRP and any updates thereto. As the project is proposed within the Northern Cape Province, the Northern Cape (DENC) is the provincial commenting authority for the project. Consultation with these authorities is being undertaken throughout the Scoping Phase. The Department of Forestry, Fisheries and the Environment indicated that no pre-application meeting is required as a Scoping phase evaluation (which included specialist and reports) which was completed and accepted by DFFE in January 2023 for the Kotulo Tsatsi Energy PV3 project (refer to **Appendix B**).

6.4.2 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 consultation process has 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 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**:
  - provide an opportunity to submit comments regarding the project;
  - assist in identifying reasonable and feasible alternatives, where required;
  - identify issues of concern and suggestions for enhanced assessment;
  - contribute relevant local information and knowledge to the environmental assessment;
  - allow registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations;
  - foster trust and co-operation;
  - generate a sense of joint responsibility and ownership of the environment;
  - comment on the findings of the Scoping Phase results; and
  - identify issues of concern and suggestions for enhanced benefits.

- During the **EIA Phase**:
  - contribute relevant local information and knowledge to the environmental assessment;
  - verify that issues have been considered in the environmental investigations as far as possible as identified within the Scoping Phase;
  - comment on the findings of the environmental assessments; and
  - attend a Focus Group Meeting to be conducted for the project.

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

The Public Participation process therefore aims to ensure that:
- Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs for their review;
- The information presented during the public participation process is presented in such a manner, i.e. local language and technical issues, that it avoids the possible alienation of the public and prevents them from participating;
- Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project;
- A variety of mechanisms are provided to I&APs to correspond and submit their comments i.e. fax, post, email, telephone, text message (SMS and WhatsApp); and
- An adequate review period is provided for I&APs to comment on the findings of the Scoping and EIA Reports.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks are required to be undertaken:
- Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
  - (i) the site where the activity to which the application relates is or is to be undertaken; and
  - (ii) any alternative site mentioned in the application.
- Give written notice to:
  - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;

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

» Place an advertisement in one local newspaper.
» Open and maintain a register of I&APs and Organs of State.
» Release of a Scoping Report for a 30-day review and comment period.
» Prepare a Comments and Responses (C&R) report which documents the comments received on the EIA process and during the 30-day review and comment period of the Scoping Report and the responses provided by the project team.

In compliance with the requirements of Chapter 6: Public Participation of the EIA Regulations, 2014 (as amended), and the approved Public Participation Plan, the following summarises the key public participation activities implemented. The schematic below provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation.

i. Stakeholder identification and register of I&APs	•Register as an I&AP on the online 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 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 text message (SMS and WhatsApp)
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 e-mail, post (as applicable), text message (SMS and WhatsApp) •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 as and when required / requested.
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, post, text message (SMS and WhatsApp) 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. Stakeholder identification and Register of Interested and Affected Parties

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

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

greater surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders were required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via phone, text message (SMS and WhatsApp), email or fax, or registering their interest via the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is listed in **Table 6.3**.

Table 6.3: Initial list of Stakeholders identified for the inclusion in the project database during the public participation process for Kotulo Tsatsi PV3

Organs of State
National Government Departments
Department of Forestry, Fisheries and the Environment (DFFE)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture, Rural Development and Land Reform (DRDLR)
Department of Water and Sanitation (DWS)
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
South African Radio Astronomy Observatory (SARAO)
Telkom SA SOC Limited
Transnet SA SOC Limited
Provincial Government Departments
Northern Cape Department of Agriculture
Northern Cape Department of Environment and Nature Conservation (NCDENC)
Northern Cape Department of Roads and Public Works
Ngwao Boswa Kapa Bokone (NBKB) – provincial Heritage Authority
Local Government Departments
Namakwa District Municipality
Hantam Local Municipality – including the Ward Councillor, ward committee members, community representative or local community forum members
Commenting Stakeholders
BirdLife South Africa
Endangered Wildlife Trust (EWT)
SENTECH
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded

parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names[22] of:

- all persons who requested to be registered on the database through the use of the online stakeholder engagement platform or in writing and disclosed their interest in the project;
- all Organs of State which hold jurisdiction in respect of the activity to which the application relates; and
- all persons who submitted written comments or attended virtual meetings (or in-person consultation where sanitary conditions can be maintained) and viewed the presentations on the Savannah Environmental online platform during the public participation process.

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

ii. Advertisements and Notifications

40.(2)(a)	Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of –
	(i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and
	(ii) Any alternative site.
40.(2)(b)	Giving written notice, in any of the manners provided for in section 47Dof the Act, to –
	(i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
	(ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;
	(iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;
	(iv) The municipality which has jurisdiction in the area;
	(v) Any organ of state having jurisdiction in respect of any aspect of the activity; and
	(vi) Any other party as required by the competent authority.
40.(2)(c)	Placing an advertisement in –
	(i) One local newspaper; or
	(ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
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

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

(iii) Any other disadvantage.

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

Scoping Phase:

- Compilation of a background information document (BID) (refer to **Appendix C3**) providing technical and environmental details on the project and how to become involved in the EIA process. The BID and the process notification letter announcing the EIA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/IAPs of Kotulo Tsatsi Energy PV3, and providing background information of the project and inviting I&APs to register on the project's database were distributed via email on 17 October 2022. The evidence of the distribution is contained in **Appendix C** of the Scoping Report. The BID was also available electronically on the Savannah Environmental website (http://www.savannahsa.com/public-documents/energy-generation/).
- Placement of site notices announcing the EIA process at visible points along the boundary of the development area (i.e. the boundaries of the affected property), in accordance with the requirements of the EIA Regulations on 20 October 2022. Photographs and the GPS co-ordinates of the site notices are contained in **Appendix C2** of the Scoping Report.
- Placement of an advertisement in the Gemsbok Newspaper on 13 October 2022 announcing the 30-day review and comment period (**Appendix C2**). This advert:
  - announced the project and the associated EIA process,
  - announced the availability of the Scoping report, the review period, and where it is accessible for review,
  - invited comment on the Scoping Report, and
  - provided all relevant details to access the Savannah Environmental online stakeholder engagement platform.
- A copy of the newspaper advert as sent to the newspaper and the newspaper advert tear sheet was included in **Appendix C2** of the Scoping Report.
- The Scoping Report was be made available for review by I&APs for a 30-day review and comment period from 18 October 2022 to 17 November 2022. The full Scoping Report was be made available on the Savannah Environmental website. The evidence of distribution of the Scoping Report was included in the Final Scoping Report submitted to the DFFE.

EIA Phase:

- A letter advising registered parties of the Acceptance of Scoping received from DFFE and the availability of the EIA Report for review and comment was distributed on **04 April 2023** to all registered I&APs on the project database.
- An advertisement announcing the availability of and inviting comment on the EIA Report was placed in the Volksblad Newspaper (in English), a local newspaper, on **04 April 2023** The tearsheet of the newspaper advert is included in **Appendix C2** of the EIA Report.
- The EIA Report made available for review by I&APs for a 30-day review and comment period from **04 April 2023 – 09 May 2023.** The EIA Report has been made available on the Savannah Environmental website and all registered I&APs have been notified of the availability on **04 April 2023** via email, which included the link to access the report on the Savannah Environmental website. I&APs have been

encouraged to view the EIA Report and submit their written comment/s to the Public Participation Team. Organs of State have also been notified via e-mail of the availability of the EIA Report and will be circulated via electronic transfer (Dropbox, WeTransfer, etc), or CD and/or hardcopy as per individual request.

iii. Public Involvement and Consultation

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

Table 6.4: Public involvement for Kotulo Tsatsi Energy PV3

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.	17 October 2022
Placement of site notices.	20 October 2022
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.	13 October 2022
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.	17 October 2022
30-day review and comment period of the Scoping Report.	18 October 2022 – 17 November 2022
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) were 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.	Focus Group meetings were held on 07 November 2022. . The meetings held included: » Northern Cape Department of Environment and Nature Conservation and Northern Cape Department of Agriculture, Forestry and fisheries » Hantam Local Municipality and Namakwa District Municipality » Affected and Adjacent Landowners
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA process
Distribution of notification letters announcing the acceptance of scoping and approval of the Plan of Study for the EIA phase and availability of the	**04 April 2023**

EIA Report for a 30-day review and comment period. The letter was distributed to Organs of State (including Government Departments, Municipal Officials, Ward Councillors, etc), landowners within the surrounding area (including neighbouring landowners) and key stakeholder groups.	
Advertising of the availability of the EIA Report for a 30-day review and comment period in Volksblad Newspaper, including details on how to access the EIA Report via Savannah Environmental's website	**04 April 2023**
30-day review and comment period of the EIA Report	**04 April 2023** to **09 May 2023**
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.	Focus Group meetings will be held during the 30-day review period. The meetings to be held will include: » Northern Cape Department of Environment and Nature Conservation and Northern Cape Department of Agriculture, Forestry and fisheries » Hantam Local Municipality and Namakwa District Municipality » Affected and Adjacent Landowners
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA process

iv. Registered I&APs entitled to Comment on the Scoping Report

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

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

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

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

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

Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database were notified by means of a notification letter of the release of the Scoping Report for a 30-day review and comment period. Similarly, I&APs registered on the database have been notified by means of a 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 notification letter of the availability of the EIAr also served to advise registered I&APs that opportunity will be provided to attend public participation meetings, and the details of these would be circulated.

The EIA Report has been made available on the Savannah Environmental website (http://www.savannahsa.com/public-documents/energy-generation/).

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period will be recorded and included in **Appendix C6** of the final EIA Report.

v. Identification and Recording of Comments

Comments raised by I&APs to date have been collated into a Comments and Responses (C&R) Report which is included in **Appendix C8** of the EIA Report. The C&R Report includes detailed responses from members of the EIA project team and/or the project proponent, and where applicable the relevant specialist, to the issues and comments raised. The C&R Report consists of all written comments received.

Meeting notes of all virtual meetings, in person meetings (as and when applicable) and discussions undertaken during the 30-day review and comment period will be included in **Appendix C7** of the final EIA Report.

The C&R Report will be updated with all comments received during the 30-day review and comment period and will be included as **Appendix C8** in the final EIA Report that will be submitted to the DFFE for decision-making.

6.5 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 L**) 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 web-based online Screening Tool associated with the development of PV3 facility and associated infrastructure

Specialist Assessment	Sensitivity Rating and Specialist Input Identified in Terms of the DFFE Screening Tool	Verification of Site-Specific Sensitivity and Motivation of the Need for Specialist Investigation

Specialist Assessment	Sensitivity Rating and Specialist Input Identified in Terms of the DFFE Screening Tool	Verification of Site-Specific Sensitivity and Motivation of the Need for Specialist Investigation
Agricultural Impact Assessment	Screenig Tool: **Low Sensitivity** Verified Sensitivity: **Low Sensitivity**	The land capabilities identified on site are of low to medium sensitivity. No high land capability sensitivities were identified within the development area. Considering the relatively low sensitivities, it is the specialist's opinion that the proposed Kotulo Tsatsi Energy PV3 Facility may proceed as planned without the concern of loss of high sensitivity land capabilities or agricultural productivity. An Agricultural Potential and Soils Impact Assessment has been undertaken for the proposed project. (**Appendix G**)
Landscape/Visual Impact Assessment	Screenig Tool: **Very High Sensitivity** Verified Sensitivity: **Medium Sensitivity**	The proposed Kotulo Tsatsi Energy PV3 Facility is located in a remote and arid part of the Northern Cape, with no particular visual or scenic features. The only potential receptors are users of the Gravel Route and several surrounding farmsteads, all more than 6km away, some of which are in a view shadow. It is the specialist opinion that the proposed Kotulo Tsatsi Energy PV3 would therefore have very low visibility and there are no fatal flaws from a visual perspective arising from the proposed project. A Visual Impact Assessment has been undertaken for the proposed project. (**Appendix I**)
Archaeological and Cultural Heritage Impact Assessment	Screenig Tool: **Low Sensitivity** Verified Sensitivity: **Low Sensitivity**	According to the DFFE Screening Tool analysis, the development area has High levels of sensitivity for impacts to archaeological and cultural heritage resources. The field assessment conducted found no significant archaeological or other heritage resources of cultural significance located within the proposed development footprints, which corroborates the findings of previous assessments conducted in this area. Furthermore, the dolerite outcrops evident in the geology map located to the east of the study area 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 will negatively impact on significant archaeological heritage. resources and as such, there is no objection to the proposed development. A Heritage Impact Assessment including an Archaeological assessment has been undertaken for the proposed project (**Appendix H**)
Palaeontology Impact Assessment	Screenig Tool: **High Sensitivity**	Although the geology of the proposed development area is highly sensitive for impacts to palaeontology, the conditions on the ground are such that the actual

Specialist Assessment	Sensitivity Rating and Specialist Input Identified in Terms of the DFFE Screening Tool	Verification of Site-Specific Sensitivity and Motivation of the Need for Specialist Investigation
	Verified Sensitivity: **Low Sensitivity**	palaeontological sensitivity is low, thus the High Sensitivity rating of the DFFE Screening Tool is disputed. As such, it is unlikely that the proposed development will negatively impact on significant palaeontological heritage. A Heritage Impact Assessment including a Palaeontological assessment has been undertaken for the proposed project (**Appendix H**)
Terrestrial Biodiversity Impact Assessment	Screenig Tool: **Low Sensitivity** Verified Sensitivity: **Low Sensitivity**	The DFFE Screening Tool indicates that the Kotulo Tsatsi Energy PV3 project site has a low sensitivity for Terrestrial Biodiversity Theme apart from some pan features present which are mapped as CBA1. Under the mitigated layout, these features have been avoided and the Kotulo Tsatsi Energy PV3 project is restricted to lower sensitivity areas. In addition, the field assessment was able to confirm the low sensitivity of the site and there are no significant vegetation or faunal features within the development footprint. The site does not lie within a NPAES Focus Area or a Strategic Water Resource Area (SWSA). As such, from a terrestrial ecology perspective there are no reasons to oppose the Kotulo Tsatsi Energy PV3 Facility. An Ecology Compliance Statement has been undertaken for the proposed project. (**Appendix D**)
Freshwater Resources Impact Assessment	Screenig Tool: **Very High Sensitivity** Verified Sensitivity: **Medium Sensitivity**	According to the DFFE Screening Tool the aquatic theme has a very high sensitivity rating. This is based on the identification and delineation of a total of 134 freshwater resource features, which include: » Seven (7) Depression Wetland (located outside of the proposed development footprint); » Three (3) large primary/major ephemeral washes; » Thirty-eight (38) minor ephemeral washes; » one hundred and seven (107) drainage channels. Based on the optimised layout for Kotulo Tsatsi Energy PV3 and the avoidance of high risk areas, it is the specialists opinion that there are no fatal flaws from a freshwater resource perspective which should prevent the Kotulo Tsatsi Energy PV3 from receiving Environmental Authorisation (EA). A freshwater assessment has been undertaken for the proposed project (**Appendix F**)
Avifauna Impact Assessment	Screenig Tool: **Low Sensitivity** Verified Sensitivity: **Low Sensitivity**	Based on the site assessment the Martial Eagles are the only avian species that may potentially be negatively influenced by the development of the Kotulo Tsatsi Energy PV3 site. Given that all structures related to the PV3 Facility lies outside the 3-km buffer of the Martial

Specialist Assessment	Sensitivity Rating and Specialist Input Identified in Terms of the DFFE Screening Tool	Verification of Site-Specific Sensitivity and Motivation of the Need for Specialist Investigation
		Eagle nests, the specialist does not anticipate any additional negative influence from either habitat loss, or construction, on the eagles or vultures. It is the specialist's opinion that the significance of the impacts assessed for the avifaunal sensitivity would be Low. Thus, based on the findings of this study no objections to the Authorisation of the Kotulo Tsastsi Energy PV3 Facility. An Avifauna Assessment has been undertaken for the proposed project that includes the assessment of avifauna (**Appendix E**)
Civil Aviation Assessment	Screenig Tool: **Low Sensitivity** Verified Sensitivity: **Low Sensitivity**	The project is located in not located close to airports or aerodromes.
Defence Assessment	Screenig Tool: **Low Sensitivity** Verified Sensitivity: **Low Sensitivity**	The project is not located within close proximity of any military base or infrastructure.
Plant Species Assessment	Screenig Tool: **Low Sensitivity** Verified Sensitivity: **Low Sensitivity**	The DFFE Screening Tool indicates that the site has a low sensitivity for the Plant Species Theme and no species of concern are known from the area. The site verification was able to confirm that there are no significant vegetation features or other plant SCC within the development footprint. The vegetation within the footprint is typical for the area and consists of low shrubland on open plains representative of the Bushmanland Basin Shrubland vegetation type, with some areas of Bushmanland Vloere near the development. Based on the results of the field assessment, the site is therefore confirmed to be low sensitivity from a Plant Species Theme perspective. An Ecology Assessment has been undertaken for the proposed project that includes the assessment of flora (**Appendix D**)
Animal Species Assessment	Screenig Tool: **Low Sensitivity** Verified Sensitivity: **Low Sensitivity**	The DFFE screening tool identified no terrestrial fauna of concern present in the area. No fauna species of concern were observed within the development area during the site assessment, confirming the low sensitivity of the development area. An Ecology Assessment and Avifauna Assessment has been undertaken for the proposed project that includes the assessment of fauna (**Appendix D** and **Appendix E**).
Social Impact	The screening report does not	A Social Impact Assessment has been undertaken for the

Specialist Assessment	Sensitivity Rating and Specialist Input Identified in Terms of the DFFE Screening Tool	Verification of Site-Specific Sensitivity and Motivation of the Need for Specialist Investigation
Assessment	indicate a rating for this theme.	Kotulo Tsatsi Energy PV3 Facility and is included in the Environmental Impact Assessment Report as **Appendix J.**

6.6 Assessment of Issues Identified through the EIA Process

Issues (both direct and indirect environmental impacts) associated with the Kotulo Tsatsi Energy PV3 facility identified within the scoping process have been evaluated through specialist studies by specialist consultants. These specialists include:

Specialist Study	Specialist Company	Specialist Name	Appendix
Ecology Impact Assessment	3Foxes Biodiversity Solutions	Simon Todd	Appendix D
Avifauna Impact Assessment	Birds & Bats Unlimited	Dr Rob Simmons	Appendix E
Freshwater Resource Study and 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	Eco-Thunder Consulting	Brogan Geldenhuys	Appendix I
Social Impact Assessment	Savannah Environmental & Tony Barbour Environmental Consulting and Research	Molatela Ledwaba and peer reviewed by Tony Barbour	Appendix J

Identified impacts are assessed in terms of the following:

- 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. EMPrs has been prepared for the project and is attached as **Appendix L1** to **L3** to this EIA Report.

6.6 Assumptions and Limitations

The following assumptions and limitations are applicable to the studies undertaken within the EIA Phase of Kotulo Tsatsi Energy PV3:

- 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 PV3 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, BESS, and grid connection infrastructure).
- 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.

6.7 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 PV3

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 PV3 project (i.e. contracted capacity of 480MW) and the triggering of Activity 1 of Listing Notice 2 (GNR 325) a full	DFFE – Competent Authority Northern Cape (DENC) – 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 DENC	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 DENC Hantam Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the 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	The Kotulo Tsatsi Energy PV3 development area is located within the regulated area of ephemeral washes and streams present within

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)).		the development area. As a result, a water use authorisation for the project will be required from DWS.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy (DMRE)	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result, a mining permit or EA in this regard is not required to be obtained.
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which 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 DENC / 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.
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 it with details regarding the location, nature, and extent of	South African Heritage Resources Agency (SAHRA) Ngwao Boswa Kapa Bokone (NBKB) – provincial heritage authority	A full HIA (with field work) has been undertaken as part of the EIA Phase (refer to **Appendix H**of this EIA Report). A Heritage Impact Assessment will be undertaken for the project as per the requirements Section 38 of the NHRA. The Heritage Impact Assessment will be made available in the EIA Phase. 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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.		(GN R668).
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).	DFFE Northern Cape DENC	Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species. Plant Species Compliance Statement has been undertaken as part of the EIA Phase and has identified the presence of listed protected species present on site which will require a permit (refer to **Appendix D2**)
National Environmental Management: Biodiversity Act (No.	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted	DFFE	An Ecological Impact Assessment has been undertaken as part of the EIA Phase to identify

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
10 of 2004) (NEM:BA)	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).	Northern Cape DENC	the presence of any alien and invasive species present on site.
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. » Any other method of treatment recognised by the executive officer that has as its object the control of plants

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			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 (DALRRD)	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**) An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any protected trees present on site which will require a permit.
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 PV3, 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 DENC – General Waste	No waste listed activities are triggered by Kotulo Tsatsi Energy PV3; 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 on-site substation and BESS components may not meet specified dimensional limitations (height and width) which will require a permit.
Provincial Policies / Legislation			
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other	Northern Cape DENC	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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.		as part of the EIA Phase (refer to **Appendix D**).

6.7.1 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 6.3: 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 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.

6.7.2 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

6.7.3 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).

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 (that is, Portion 2 of Farm Styns Vley 280 and the grid connection corridor). Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, Kotulo Tsatsi Energy PV3 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 EIA 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 PV3 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 PV3. 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 as part of this EIA Report.

7.2. Regional Setting

The Kotulo Tsatsi Energy PV3 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 PV3 falls within Ward 3 of the Hantam Local Municipality, under the Namakwa District Municipality. A regional map of the study area and the development area is provided in **Figure 7.1.**

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 single abandoned farmhouse (known as Valsvlei) and associated buildings is located on the property.

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. The proposed grid connection corridor runs parallel to this Eskom 400kV power line.

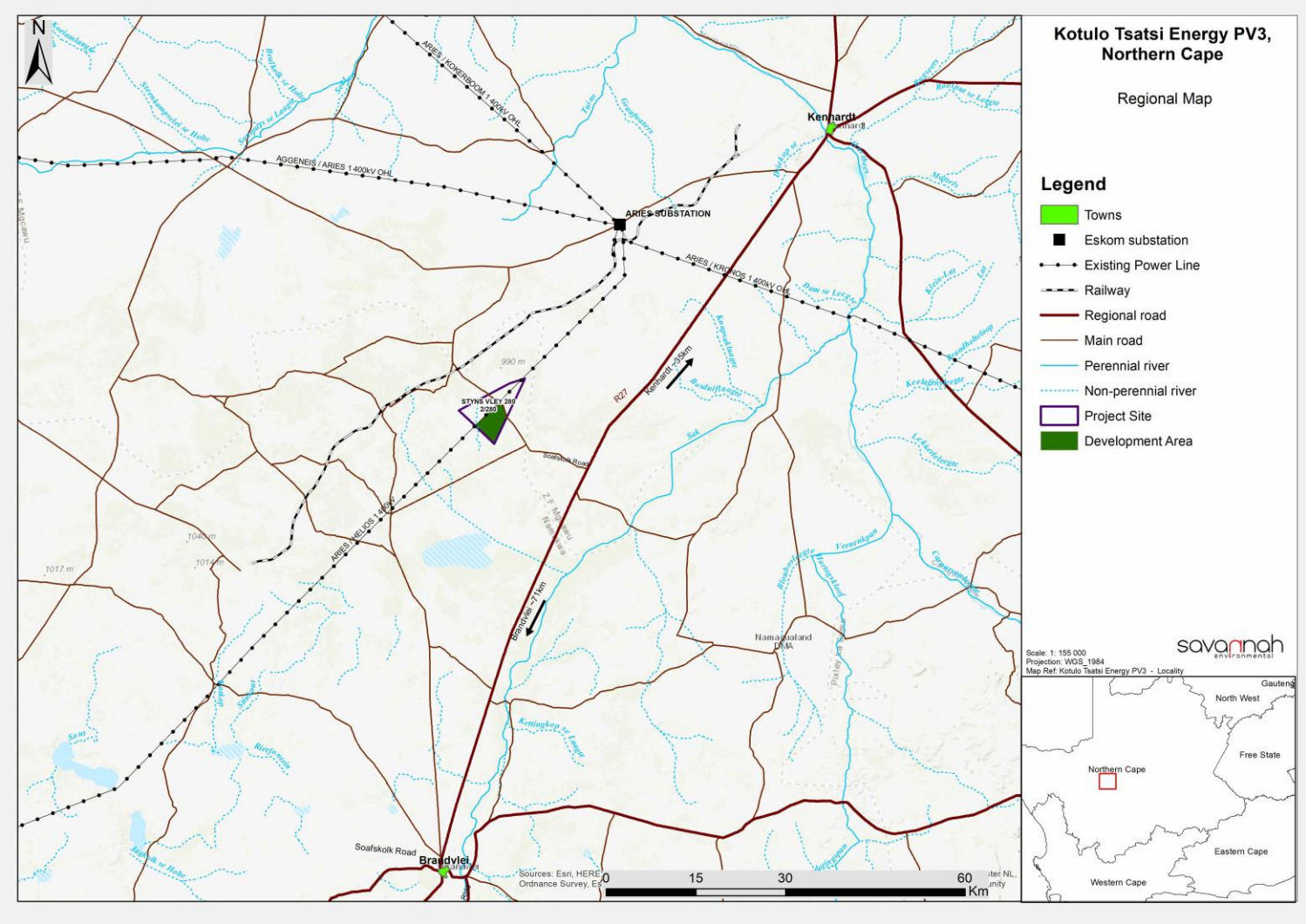

Figure 7.1: Regional map showing the location of the development area for Kotulo Tsatsi Energy PV3

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 development area is characterised by a slope percentage in the range 0-6%, with a maximum up to 15%. This indicates a uniform, flat topography with undulating areas. The Digital Elevation Model (DEM) of the development area indicates an elevation of 911m to 952m above mean sea level (amsl).

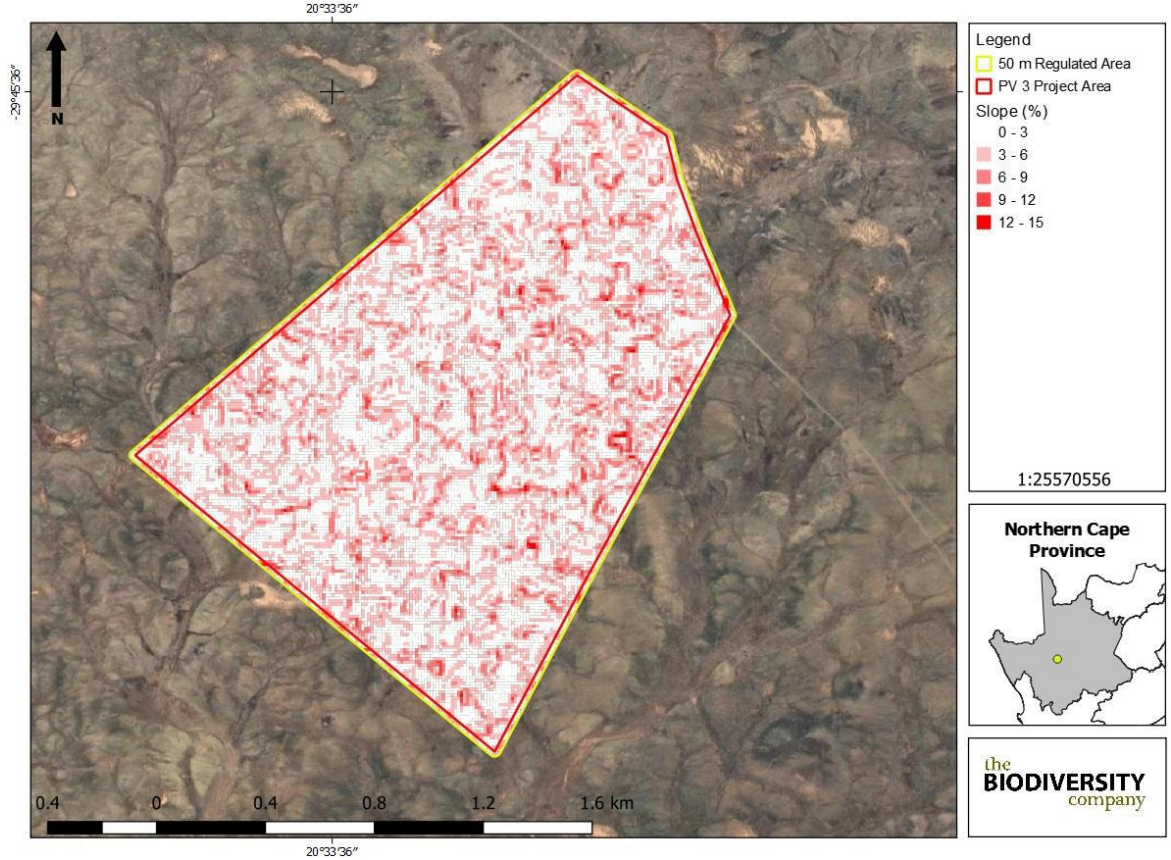

Figure 7.2: Slope assessment for the Kotulo Tsatsi Energy PV3 development area

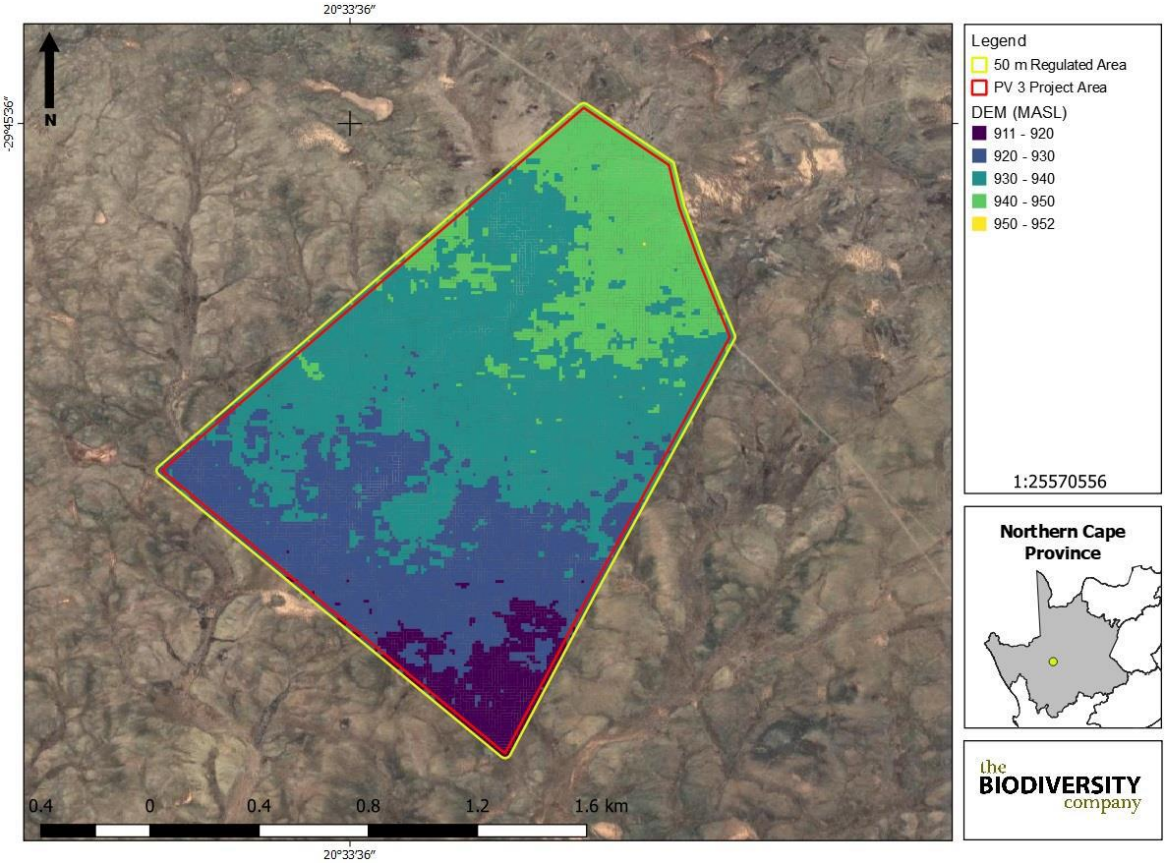

Figure 7.3: Digital Elevation Model of the Kotulo Tsatsi Energy PV3 development area

7.4.2. Geology, Soils and Agricultural Potential

According to the land type database , the development area falls within the Fc137 land type. The Fc land type consists of Glenrosa and/or Mispah soil forms with the possibility of the other soils occurring throughout. Lime is rare or absent within this land type in upland soils but generally present in low-lying areas.

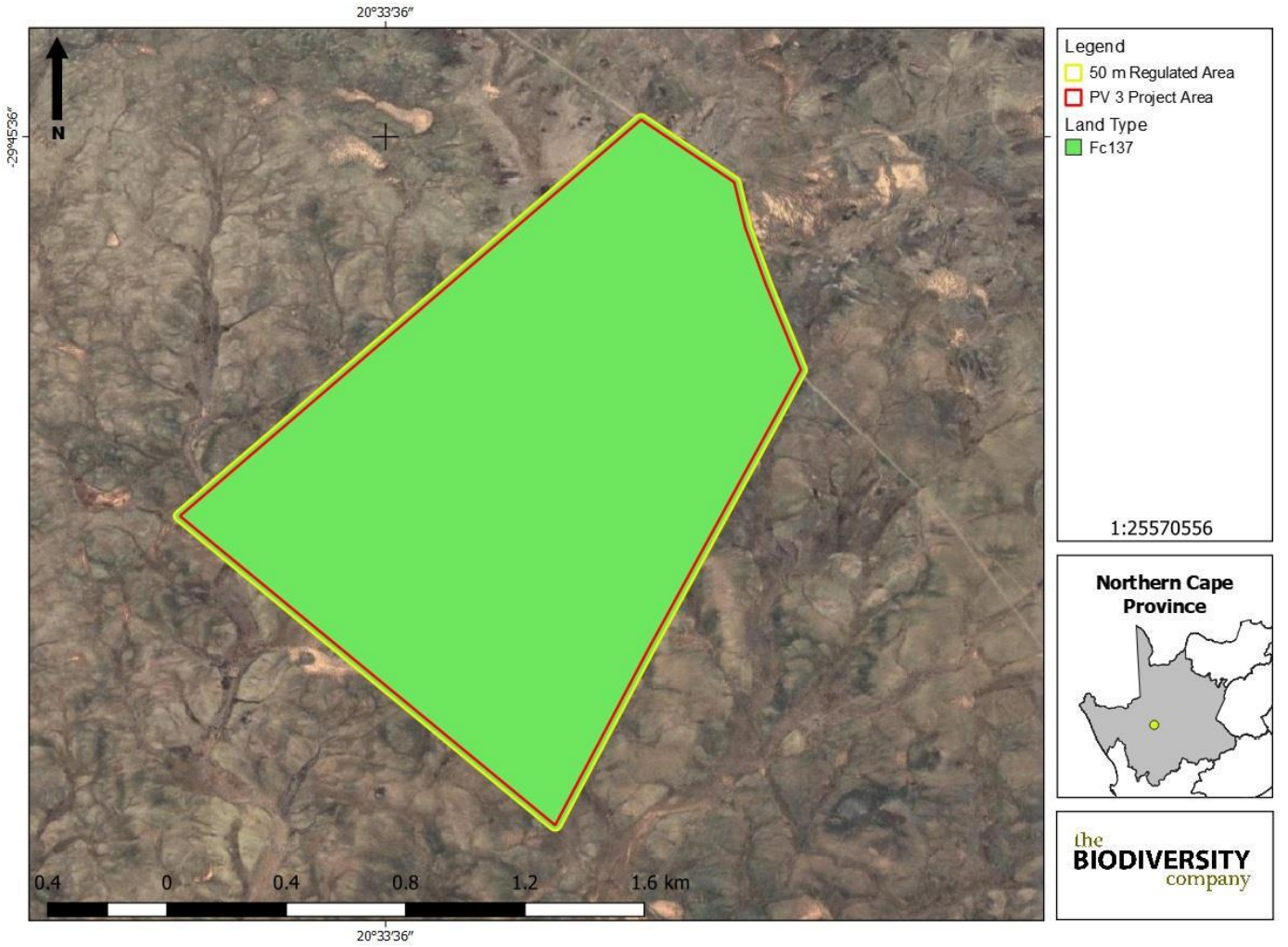

Figure 7.4: Land type present Kotulo Tsatsi Energy PV3 development area

The soils expected to occur with the respective terrain units for the Fc 137 land type is illustrated in **Figure 7.5** and **Table 7.1**.

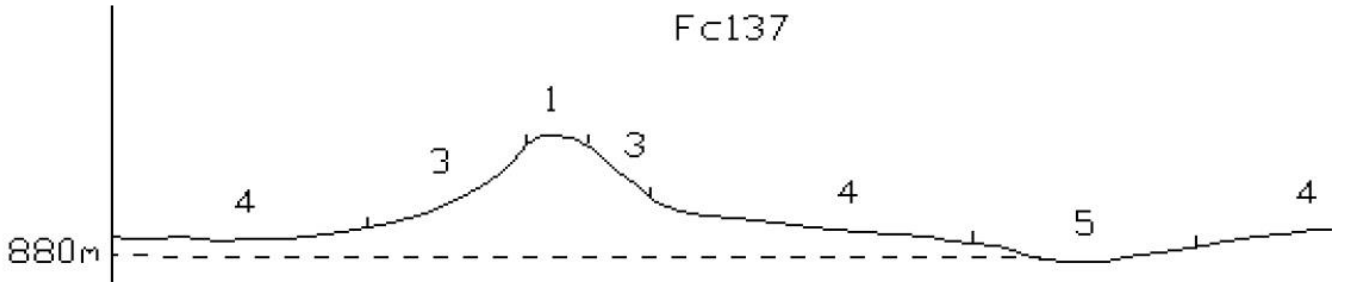

Figure 7.5: Terrain form sketch of Land Type Fc137

Table 7.1: Soils expected at the respective terrain units within the Fc 137 land type

Terrain Units							
1 (12%)		3 (31%)		4 (55%)		5(12%)	
Bare Rock	63%	Bare Rock	39%	Clovelly	46%	Clovelly	48%
Mispah	33%	Mispah	39%	Mispah	23%	Oakleaf	41%
Clovelly	3%	Clovelly	19%	Bare Rock	20%	Mispah	7%

Glenrosa	1%	Glenrosa	3%	Glenrosa	11%	Bare Rock	2%
						Glenrosa	2%

i. Soil and agricultural potential

The following soil associations have been distinguished for the development area:

» Five (5) soil forms were identified include Augrabies, Clovllely, Mispah, Bare Rock and Prieska;
» The agricultural potential for the identified soils were determined to all be "Very Low".
» The climate potential was determined to be very low; and
» The arid climate of study area coupled with shallow soils limits the agricultural potential to low intensity grazing.

ii. Land Capability Sensitivity

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa. Two land capabilities have been identified within the development footprint:

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

The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low" to "Moderate" sensitivities (refer to **Figure 7.6**).

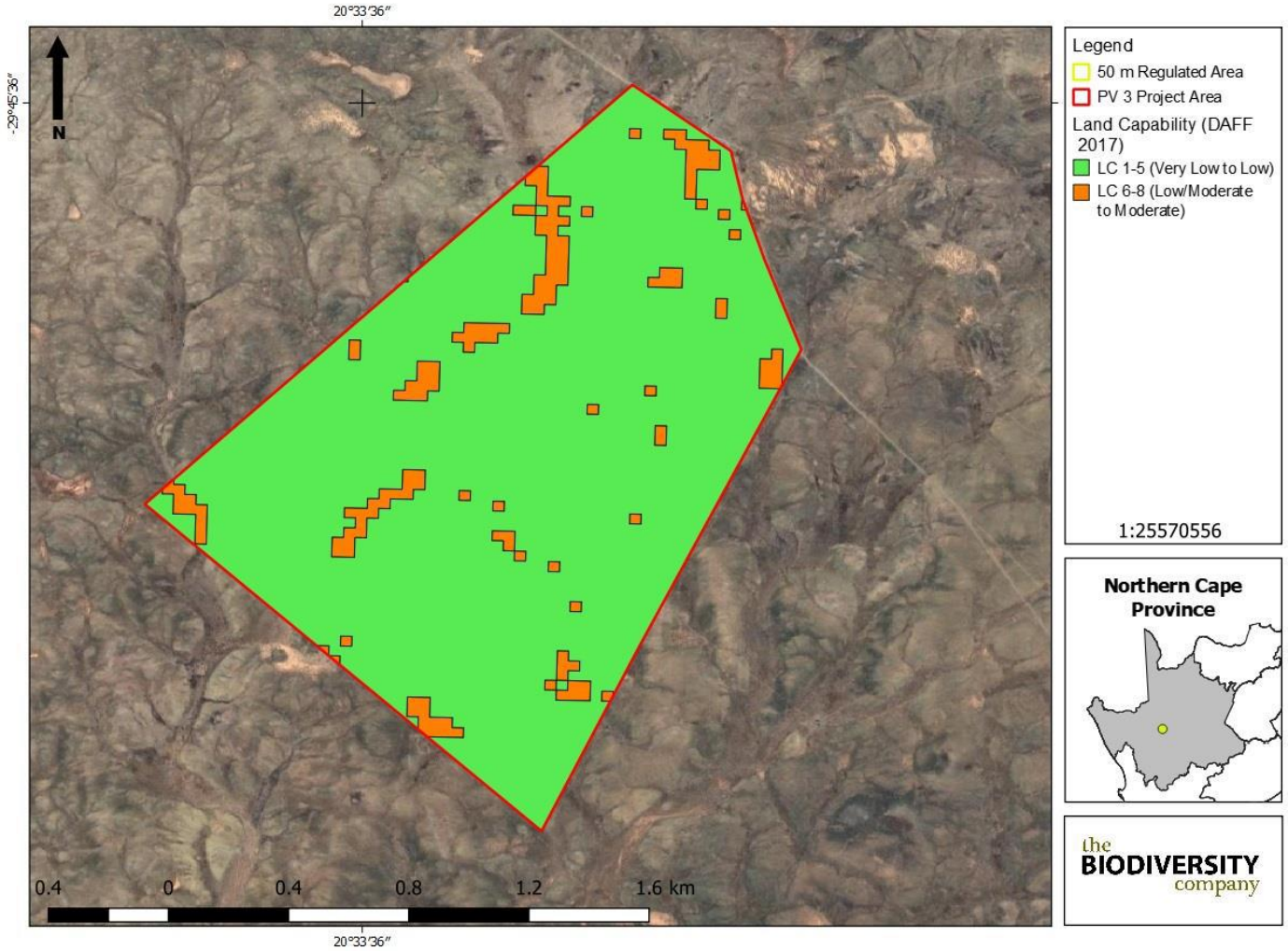

Figure 7.6: Land capabilities sensitivity of the Kotulo Tsatsi Energy PV3

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

i. Vegetation types

The Kotulo Tsatsi Energy PV3 Facility falls almost entirely within the Bushmanland Basin Shrubland vegetation type, with two pans present that represent the Bushmanland Vloere vegetation type, that would not be built onto. Bushmanland Basin Shrubland is an extensive vegetation type that occupies over 34 000 km^2 of the Northern Cape and is among the most extensive vegetation types in South Africa. 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. The field assessment identified the following species as common and characteristic species at the site: Shrubs such as *Rhigozum trichotomum, Phaeoptilum spinosum*, *Lycium pumilum*, *Aizoon schellenbergii*, *Osteospermum armatum*, *Eriocephalus pauperrimus*, *Rosenia glandulosa*, *Pteronia leucoclada, P.glomerata*, *P.sordida*, *P.leucoclada, Salsola tuberculata*, *Sarcocaulon patersonii*, *Hermannia spinosa*, *Osteospermum armatum*, and *Zygophyllum chrysopteron*. Grasses present include *Stipagrostis ciliate, Stipagrostis obtusa*, *Stipagrostis uniplumis Enneapogon scaber*, *E.desvauxii*, *Fingerhuthia africana* and *Aristida adscensionis*. The only species of significance present are occasional individuals of the provincially protected species *Aloe claviflora* and *Hoodia gordonii* which occur at a low density.

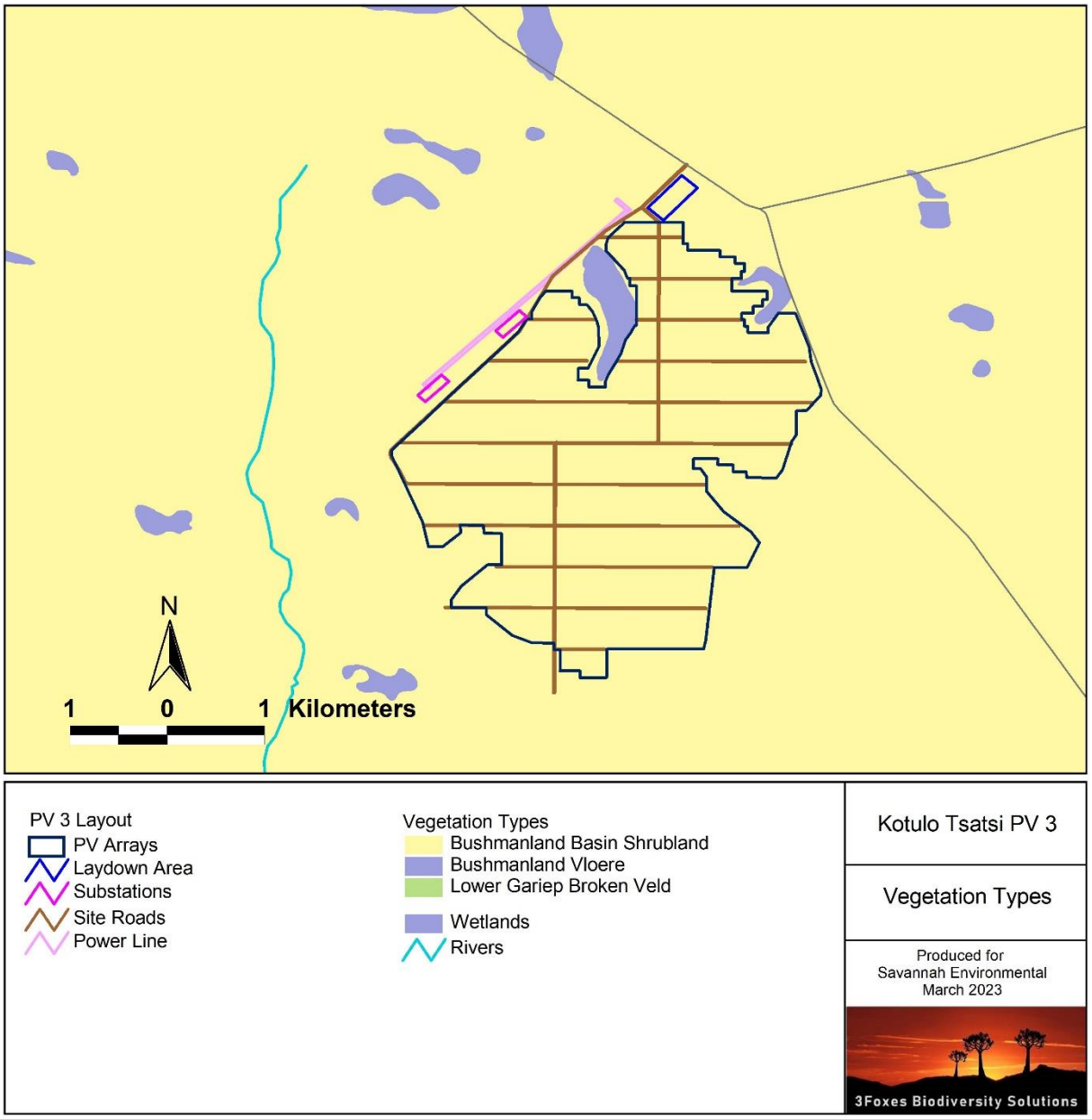

Figure 7.7: Vegetation map of the Kotulo Tsatsi Energy PV3 Facility development area, showing that the site falls within the Bushmanland Basin Shrubland vegetation type, with some pans present that represent the Bushmanland Vloere vegetation type

Figure 7.8: Typical open plains within the Kotulo Tsatsi Energy PV3 site representing the Bushmanland Basin Shrubland vegetation type.

Figure 7.9: There are pans in the vicinity of the Kotulo Tstatsi PV3 development area which correspond with the Bushmanland Vloere vegetation type

ii. Listed Plant Species

According to the DFFE Screening Tool, there are no plant species of concern that are known to occur in the immediate vicinity of the Kotulo Tsatsi Energy PV3 development area. No plant species of concern

were observed during the field assessment, with the result that the sensitivity of the site can be confirmed to be low. There are however several provincially protected species present on the site including all *Aloe* species present, all *Amaryllidaceae*, all *Asclepiadaceae*, all *Iridaceae*, all *Mesembryanthemaceae* and any other species as listed in the Northern Cape Nature Conservation Act 9 of 2009. These species would require a permit to destroy or translocate should the project commence to construction.

iii. Fauna

In terms of the fauna that potentially occur in the broad area, the potential diversity is considered to be moderate and numbers approximately 48 mammals, 30 reptiles and about 8 frog and toads. Species observed in the area include Yellow Mongoose *Cynictis penicillata*, South African Ground Squirrel *Xerus inauris*, Steenbok *Raphicerus campestris*, Common Duiker *Sylvicapra grimmia,* Aardvark *Orycteropus afer*, Aardwolf *Proteles cristatus*, Cape Porcupine *Hystrix africaeaustralis*, Bat-Eared Fox *Otocyon megalotis* and Stiped Polecat *Ictonyx striatus*. Widespread predators such as Caracal *Caracal caracal*, Black-backed Jackal *Canis mesomelas* and Cape Fox *Vulpes chama* are also likely to be present at typically low density for an arid area. Reptile abundance on the site is low, which likely relates to general lack of vegetation or rock cover. The Namaqua Sand Lizard *Pedioplanis namaquensis* and Ground Agama *Agama aculeata* are the only species observed during the site visits. Due to the aridity of the area, amphibian abundance is very low. The pans are usually quite saline with the result that these features are not usually used by amphibians for breeding purposes. There are no amphibians of concern that are known to occur in the area.

Parotomys littledalei, Littledale's Whistling Rat, is listed as Near Threatened and is the only terrestrial faunal species of concern that may be present in the area. This species is typically associated with riverine habitat, particularly with *Lycium* bushes or *Psilocaulon absimile* plants, where there is some perennially green vegetation. As there is no suitable habitat present for this species on the site, it is considered highly unlikely that this species is present on-site.

iv. Critical Biodiversity Areas and Broad-Scale Processes

The CBA and ESA map for the broader project area is indicated **Figure 7.10** and indicates that there are two areas of CBA1 in close proximity to the PV arrays, but that these areas have been avoided. The development footprint is restricted to areas that are not classified as CBAs, ESAs or Northern Cape-PAES Focus Areas, with the result that the development would not have a significant impact on this conservation planning and broad-scale process features.

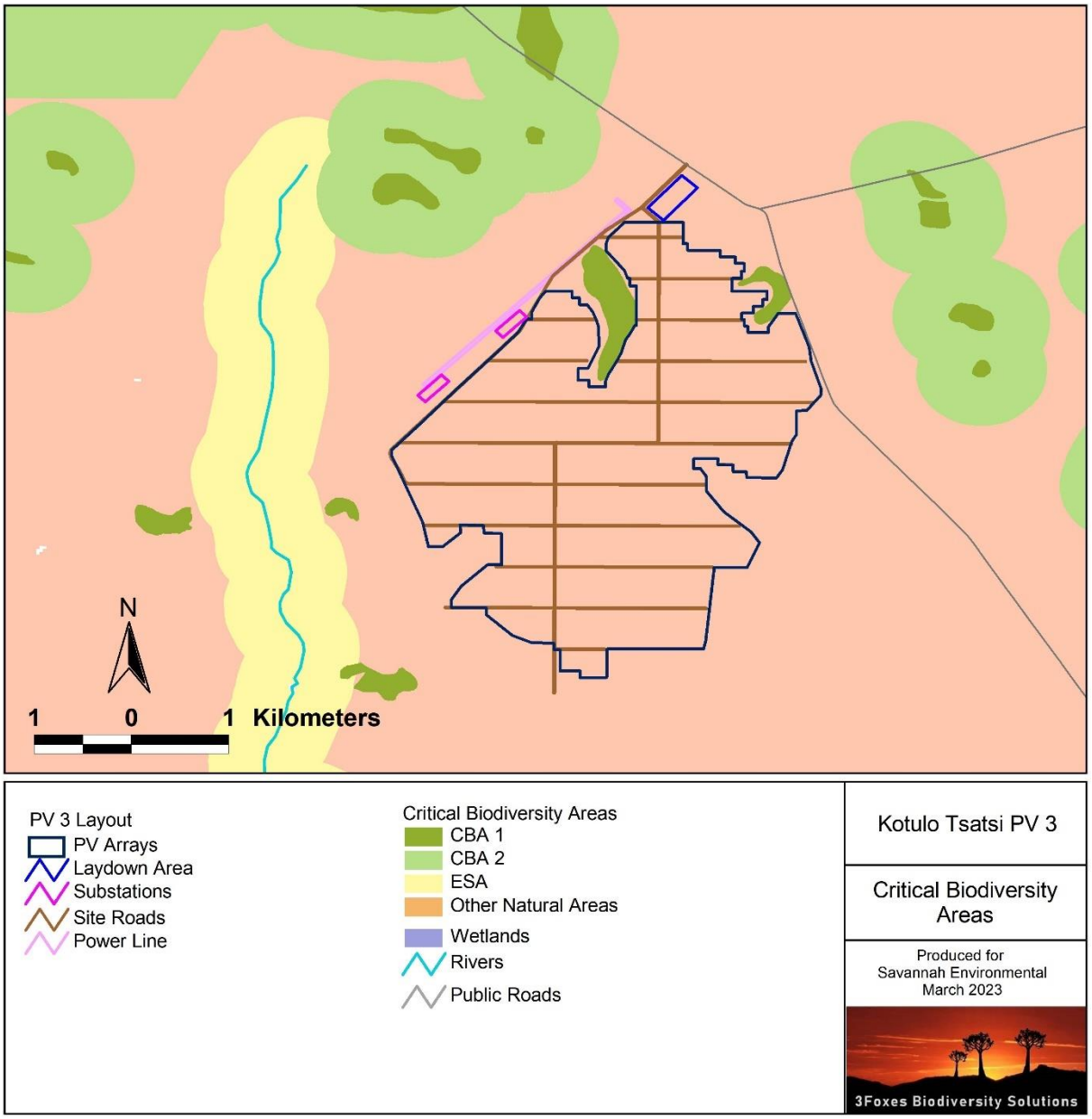

Figure 7.10: Critical Biodiversity Areas and ESAs for the Kotulo Tsatsi Energy PV3 development area, which is an extract of the Northern Cape CBA map.

v. Avifauna

The development area lies in a very arid area of Karooid vegetation, interspersed with dry pans, and with a mean annual rainfall varying from 150–200mm and midday temperatures averaging 19.3°C (winter) to 35.5°C (summer). The area is dry most of the year with rainfall concentrated in a short period from January to April, peaking in March. Little of the area is formerly conserved but has enjoyed some protection through the Namakwa Bioregional Plan.

A biodiversity corridor was suggested and runs through the southern section of the development area. Such corridors are typically a conservation planner's tool, allowing the passage of terrestrial animals and plants between conservation "islands", to ensure genetic mixing of otherwise isolated groups. For aerial organisms such as bats and birds, such corridors are likely to play a lesser role in a conservation sense, but

they may be important for wetland birds such as flamingos passing through to flooded pans. Therefore, wetland species in the area were noted.

» ***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
» Pan (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;

Furthermore, artificial habitats are provided by

» the existing power lines and accompanying pylons/towers. The pylons are used mainly by large raptorial birds from which to hunt and occasionally nest on (goshawks, kestrels and eagles), and
» the water points that are scattered across the landscape for livestock. Large numbers of birds are attracted to artificial watering points when holding water.

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

Figure 7.11: Two vegetation types used by the avian community. Open rocky ground with grasses (foreground) and the dry river washes dominated by Rhigozum bushes.

Figure 7.12: Artificial habitat created by pylons and transmission lines within the study area. These are used by raptors for perching and breeding (inset). Bustards regularly hit, and are killed, by the lines. The Martial Eagle nest on the top stanchion (circled) was active in June 2016 (inset) with the adult visible on the nest, but inactive in 2020 and 2021.

Figure 7.13: Artificial water reservoirs for livestock are a mecca for birds in this very dry landscape and attract hundreds of birds daily, including Sparrow-larks, Lark-like buntings, and Black-headed Canaries *Crithagra alario* (inset). Up to 250 birds/day can be attracted in the dry season.

Figure 7.14: The greater Kotulo Tsatsi landscape was transformed with the advent of heavy rains in March 2022, with grass, locusts and mosquitoes in abundance.

Avian species richness and red data species

In the dry period the expanded (50 000km^2) Kotulo Tsatsi site supported five Red Data species in a low avian richness total of 72 species during 2014-2016. However, this increased to 13 Red Data species once rains broke the drought in 2021 and 2022 (refer to **Table 7.2**).

Table 7.2: The 13 Red Data bird species of the 16 Priority species recorded and their likelihood of occurrence on the Kotulo Tsatsi Energy PV3 expanded site based on the number of times recorded by BBU over 50 days of field work. Taken from all (8) site visits June 2016 (12 days), March 2015 (5 d), September 2014 (7 d), December 2020 (2 d), February 2021 (6 d), May 2021 (6 d), August 2021 (6 d), and March 2022 (6 d). Collision ranking is taken from the list of the top 100 collision-prone species (Ralston et al. 2017). Rows shaded in grey indicate Red Data species seen over or near the PV3 site

Common Name	Scientific name	Red-list category	Collision Rank	Likelihood	Habitat
Cape Vulture	*Gyps coprotheres*	Endangered	1	1/50 = 2%	Arid montane
Verreaux's Eagle	*Aquila verreauxii*	Vulnerable	2	4/50 = 8%	Rocky montane
Ludwig's Bustard	*Neotis ludwigi*	Endangered	10	7/50 = 14%	Open grassland
Secretarybird	*Sagittarius serpentarius*	Vulnerable	12	1/50 = 2%	Open grassland
Lappet-faced	*Torgos tracheliotus*	Endangered	16	6/50 = 12%	Treed arid savanna

Vulture					
White-backed Vulture	*Gyps africanus*	Endangered	21	5/50 = 10%	Treed Savanna
Lanner Falcon	*Falco biarmicus*	Vulnerable	22	8/50 = 16%	Arid habitats
Martial Eagle	*Polemaetus bellicosus*	Endangered	23	9/50 = 18%	Treed Savannas
Kori Bustard	*Ardeotis kori*	Near Threatened	37	2/50 = 4%	Grassland, Savanna
Red Lark	*Calendulauda burra*	Vulnerable	39	1/50 = 2%	Arid grassland
Sclater's Lark	*Spizocorys sclateri*	Near Threatened	47	8/50 = 16%	Open rocky/grassland
Karoo Korhaan	*Eupodotis vigorsii*	Near Threatened	49	36/50= 72%	Shrublands
Burchell's Courser	*Corsorius rufus*	Vulnerable	69	1/50 = 2%	Arid stoney plains

Also, Endangered Martial Eagles *Polemaetus bellicosus* twice bred (successfully) on the 400kV pylons traversing the study area in 2014 and 2016. No breeding was evident in 2015 or 2020, or 2021, probably due to an incident that killed an adult eagle.

Lanner Falcons Falco *biarmicus* were the least common of the Red Data species and occurred north of the PV project site.

Only one of the two red-listed larks expected in the project site was recorded. They were recorded on five of the total 26 survey days. No Red Larks *Calendulauda burra* were recorded. The absence of this *Vulnerable* species may have arisen from the lack of red dunes (their preferred habitat) or appropriate grasses in the surveyed areas.

No other Red Data species (Secretarybird, Red Lark, Verreaux's Eagle, Lesser- and Greater Flamingo) referred to by Smallie and Shaw (2013) were recorded in our survey. These may, therefore, be uncommon visitors except at times of higher rainfall.

vi. Freshwater Features

The on-site / in-field assessment of the freshwater resource indicators was conducted from the 14st to the 16th of January 2021.

There are a number of rivers running across the development area, all of which ultimately confluence with the Grootvloer / Brandvlei pan/depression system to the south. The Sak River also flows into these extensive

depression features around Brandvlei, and then into the Grootvloer pan/depression just to the north, which only flows out northwards during periods of high flow, flowing into the Hartbees River and then the Orange River.

All of the freshwater resource features on and around the development area are intermittent or ephemeral, being inundated only for brief periods each year, with periods of drought that are unpredictable in duration.

A dominant feature of the site is the alluvial floodplains or washes. These systems are difficult to classify, as their hydrological and geomorphological characteristics (the way water and sediment flows into, through and out of these features) are difficult to determine, and the ecological functioning and importance of these alluvial features are little known. They are typically characterised by multiple channels that traverse a floodplain, valley floor or alluvial fan. Surface water may flow along a particular channel in one year, but due to their being little topographic definition or gradient across the landscape, a parallel channel may be eroded the following year, leading to a network of channels. Some freshwater ecologists call these features "dendritic drainage systems", while others refer to them as washes or floodplains. They tend to be classified as rivers rather than wetlands as they show very few wetland characteristics in the strictest sense.

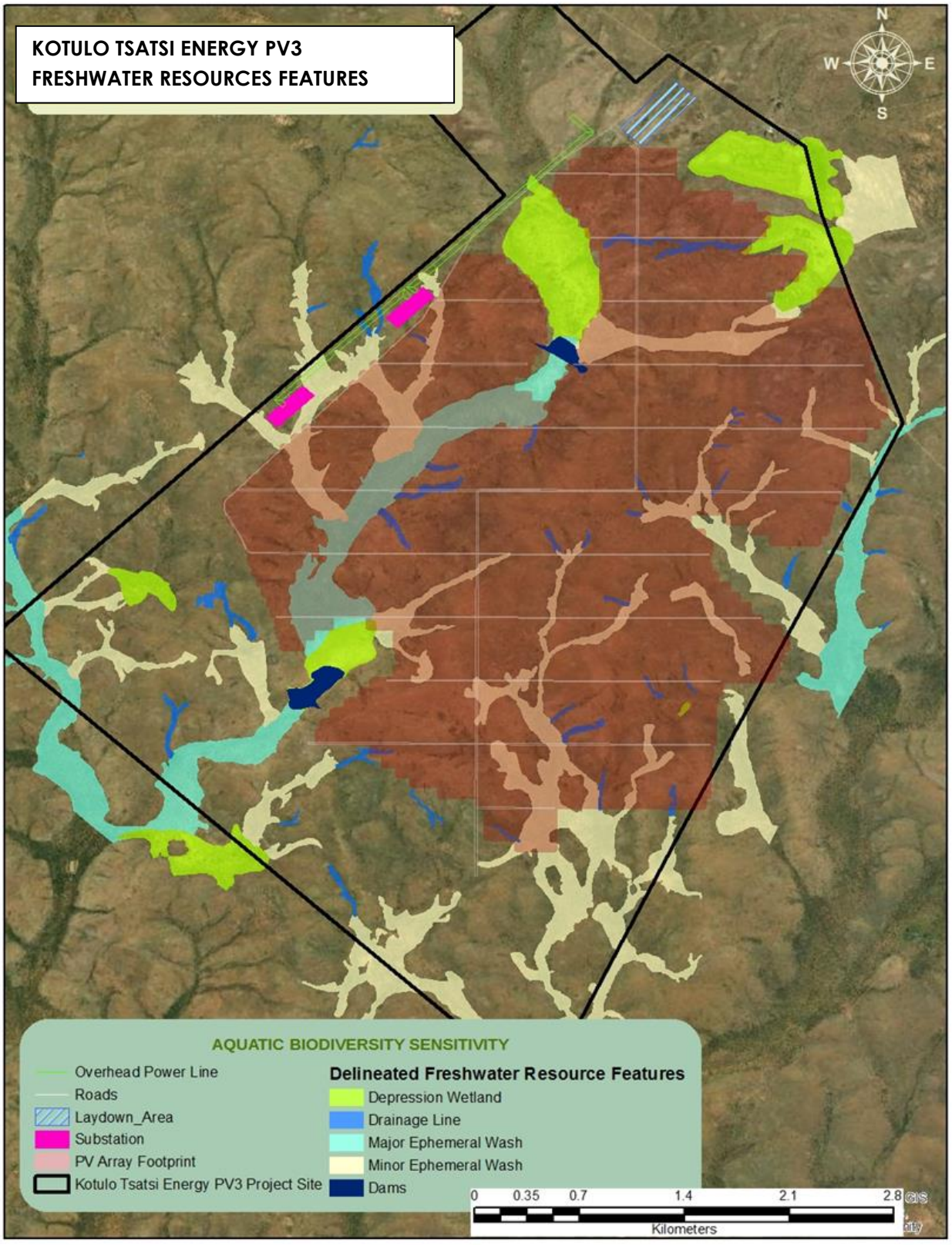

Figure 7.15: Delineated freshwater resource features within the Kotulo Tsatsi Energy PV3 development area.

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

7.5.1. Historical and Archaeological Background

Archaeology

The area proposed for the development of the Kotulo Tsatsi Energy PV 3 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 the field assessment are considered worthy of conservation.

These findings correlate with the findings of Van der Walt (2014, 2015 and 2017) from the same area and it is agreed that, as per his findings; In the study area there were only a few areas where surface material was noted. Artefact density is so low that they do not represent individual sites but rather background scatter or find spots.

All observations are on the surface and there are no indicators that would suggest deeply stratified material anywhere in the study area. No associated organic remains (such as bone or ostrich eggshell) were noted with any of the stone scatters. Most of the material observed can probably be ascribed to the Middle Stone Age although some can be ascribed to the LSA and are smaller in size (< 5 cm in length). Miscellaneous flakes, blades and chunks make up the majority of the scatters, and retouch was present on some items.

Heritage Resources

Despite detailed inspection of the dolerite outcrops, no engravings were found. Furthermore, the generally low density of artefacts found on the farms was notable. As found by Van der Walt in 2014, the regular distribution of sparse artefacts and isolated finds can be detected across the entire development area but dense site concentrations are virtually absent and, in this case, even the dolerite outcrops here only moderately dense artefact scatters. The dolerite outcrops here are much smaller than the major ones in neighbouring areas containing engravings and no perennial streams or rivers are found here. Based on the evidence, it does not appear that the study area was used extensively during the Stone Age.

Two main, modern farmhouse complexes lie along the north-northwest gravel road on the northern end of the development area.

7.5.2. Palaeontology

According to the SAHRIS Palaeosensitivity Map (refer to **Figure 7.16**), the area proposed for development is underlain by sediments of moderate and high sensitivity for impacts to palaeontological heritage. According to the extract from the Council of GeoScience Map 2920 for Kenhardt (Figure 3.2), the area proposed for development is underlain by sediments from the Prince Albert Formation from the Ecca Group which have high palaeontological sensitivity.

Desktop analysis of the fossil records of the various sedimentary rock units underlying the development area, combined with field assessment of numerous representative rock exposures within and close to the development area, indicate that all of these 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.

7.6 Visual Context

The result of the viewshed analyses for the Kotulo Tsatsi Energy PV3 is shown on **Figure 7.18.** The viewshed analyses was undertaken from a number of vantage points within the development area at an offset of 6m above average ground level. This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures (PV panels) associated with the facility.

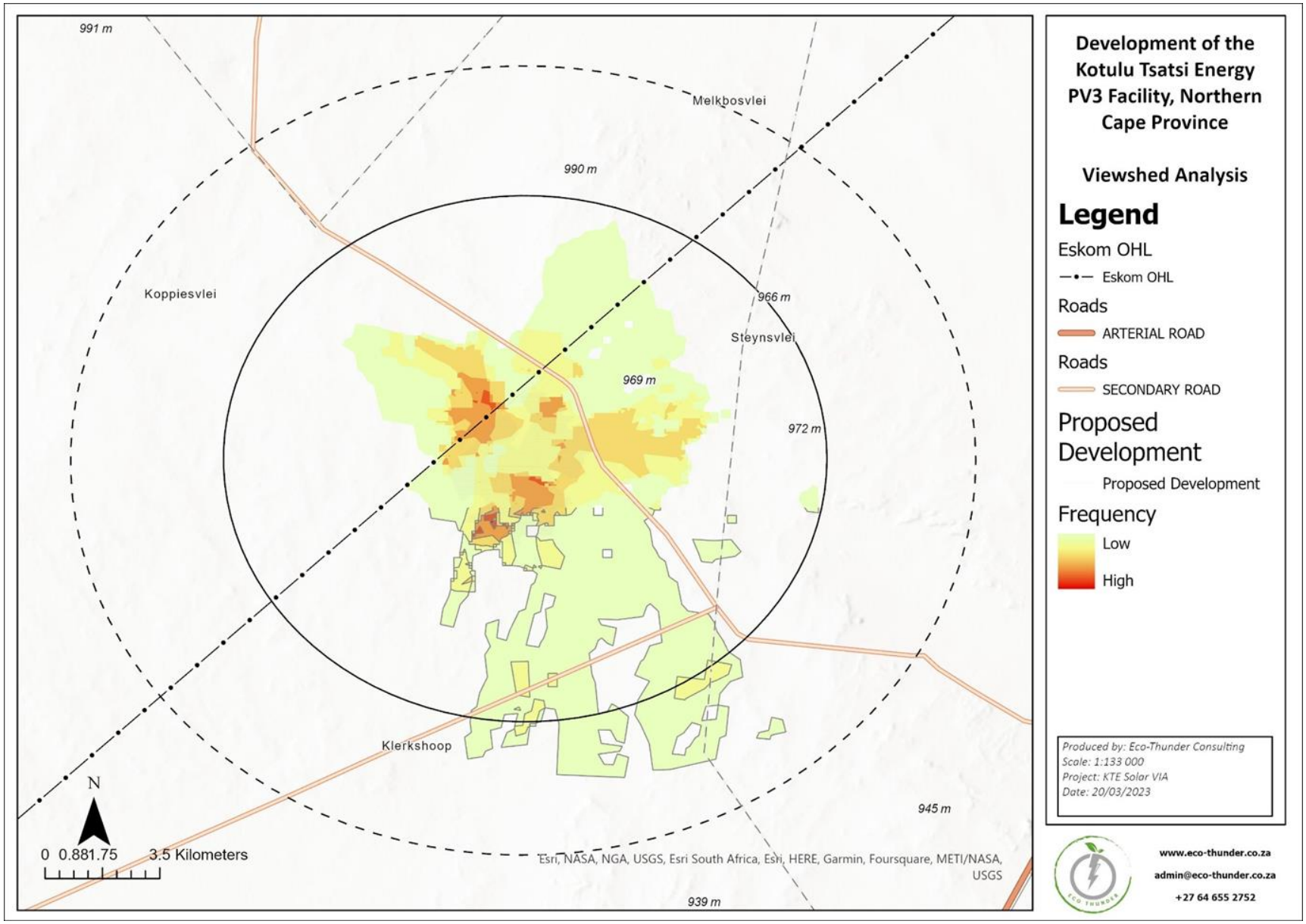

Figure 7.18: Viewshed analysis of the Kotulo Tsatsi Energy PV3 facility

The following is evident from the viewshed analyses:

0 – 1km (Very High sensitivity area)
The main project components are anticipated to fall within this area, the anticipated visual exposure of the facility is contained to a core area on the site itself and within a 1km radius thereof. There is only one farm, which is located on the same property as the development within this zone. The gravel road falls directly northeast of the development within this zone. Observers travelling along this road will be exposed to the project infrastructure. In addition, the existing Aries OHL runs to the north of the Kotulo Tstatsi Energy PV3 Facility.

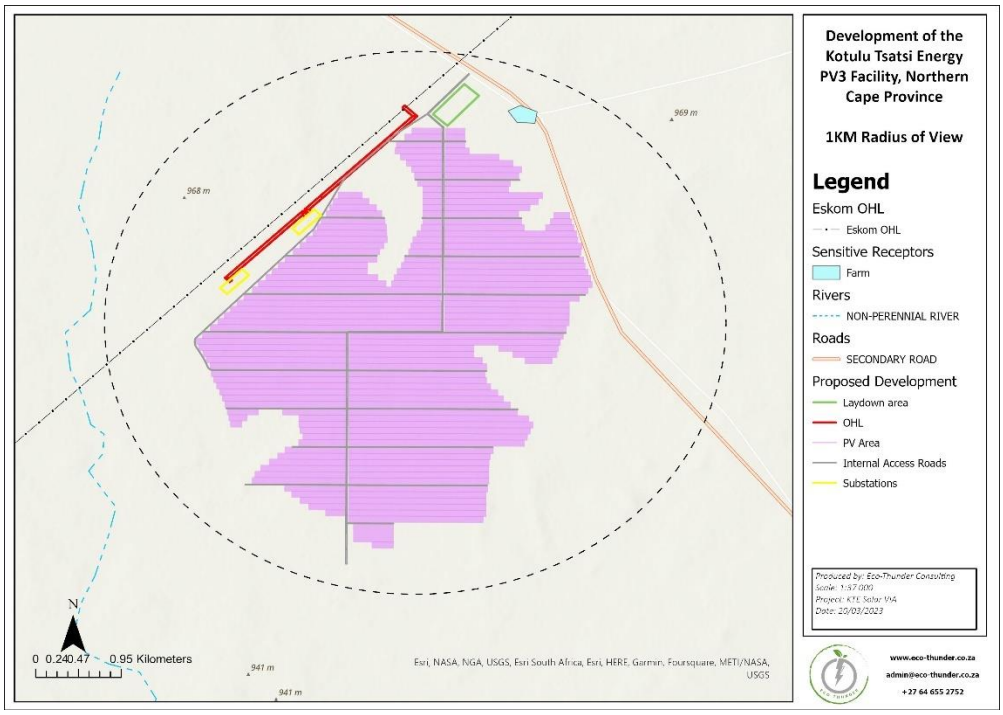

Figure 7.19: 1km Visual exposure area

1 – 3km (High Sensitivity)
Potential visual exposure in the short to medium distance (i.e., between 1 and 3km), is largely highly scattered with the most line of sight being from the additional stretches of the gravel road.

The majority of this area is agricultural or vacant land. There are some areas in which the topography is relatively flat with little to no tall vegetation.

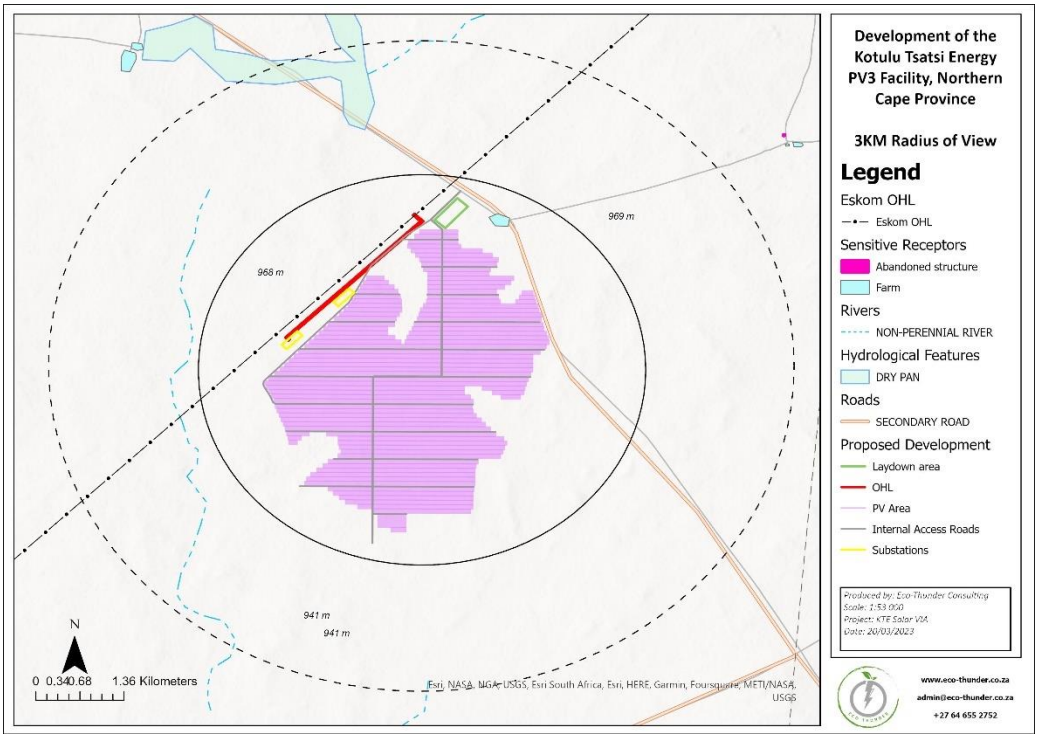

Figure 7.20: 3km Visual exposure area

3 – 6km (Moderate Sensitivity)

Within this observation the visual exposure becomes very scattered and interrupted some additional settlements and additional roads falling within this zone of observation.

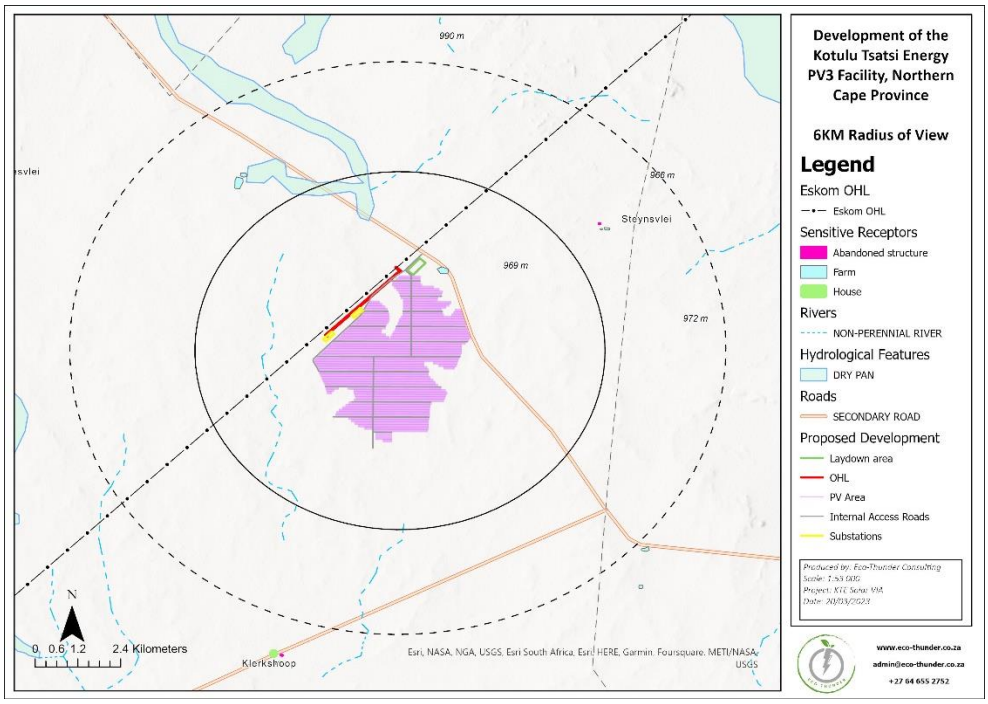

Figure 7.21: *6km* Visual *exposure area*

6 – 10km (Very Low Sensitivity)
At distances exceeding 6km the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (development) and the observer.

It is clear that the relatively constrained dimensions of the PV facility would amount to a fairly limited area of potential visual exposure. The visual exposure would largely be contained within a 6km radius of the proposed development site.

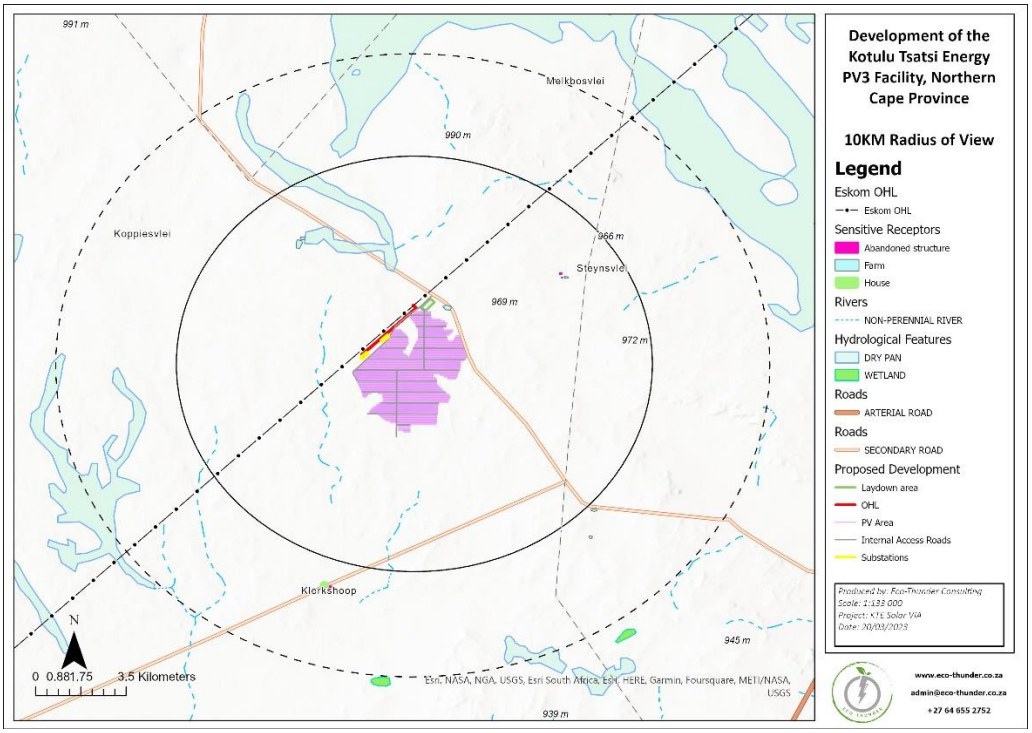

Figure 7.22: 10km Visual exposure area

7.7 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.

Soafskolk Road road (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 traverse the study area from the south west to the north east. This railway line bypasses the site to the north west while the power line transects the site.

7.7.1 Demographic Profile

The proposed development is within the jurisdiction of the Hantam Municipality over 36 128 km^2, which accounts for 28% of the total area (126 836km^2) of the Namakwa District Municipality within which it lies. The Hantam Municipality is located in the District's south-western corner, situated between the municipalities of the Northern Cape and the Western Cape.

The majority of the population within the municipality lives in Calvinia, Nieuwoudtville, Loeriesfontein, Brandvlei, and Middelpos. The largest is Calvinia, followed by Loeriesfontein, Nieuwoudtville, Brandvlei, and Middelpos. In terms of demographics, the HLM has a population of 21505 people. Between 2011 and 2017 the population increased by an average of 0.2% annually, with a marginally high increase (0,3%) per annum in the number of households.

7.7.2 Economic Profile of the Hantam Local Municipality

The Hantam Municipality has a small economy, accounting for about 13% of the Namakwa district's 2017 Gross Value Added (GVA), up from 12% in 2016. These contributions to growth are negligible proportions (1.6%) of the provincial economy in both years and are similar to the respective contributions in 2011.

Employment and unemployment rates are important as these give an indicator of socio-economic well-being, as employment is how most households generate income to supply their basic needs. Hantam has the lowest unemployment rates at 5165 (0r 38.2%) of the working age population was formally employed in 2017, compared to 5224 (or 39.3%) in 2016 and 5 614 (or 37.4%) in 2001, i.e., a relative improvement in overall formal employment since 2001 but worsening in recent years. These figures also represent a worsening trend if measured in number of persons employed. The number of unemployed persons (802) in the municipal area in 2017 was more or less the same as in 2016 (746) and in 2001 (779). These trends must be seen in the light of the general depopulation of the municipality, i.e., a smaller working age population and the high percentage of persons not economically active. (Hantam, IDP).

The Hantam LM's primary economic sectors include agriculture, tourism, mining, and renewable energy.

7.7.3 Settlement and infrastructure

The project development area is located on Portion 2 of the Farm Styns Vley 280. which is unoccupied. The next nearest homestead is a farmhouse at Gannakom which is located west of 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 Project. 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.

Table 7.2 provides a baseline summary of the socio-economic profile of the Hantam LM within which Kotulo Tsatsi Energy PV3 is proposed. The data presented in this section have been derived from the 2016 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[23].

Table 7.6: Baseline description of the socio-economic characteristics of the area proposed for Kotulo Tsatsi Energy PV3

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. » 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.

[23] 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).

CHAPTER 8: ASSESSMENT OF IMPACTS

This chapter provides an assessment of the significance of the positive and negative environmental impacts (direct and indirect) expected to be associated with the Kotulo Tsatsi Energy PV3 facility and its associated infrastructure. Cumulative impacts are assessed in Chapter 9. This assessment has considered the construction of a solar PV facility with a contracted capacity of up to 480 MW with a development footprint of approximately ~1350ha within Portion 2 of the Farm Styns Vley 280. The project will comprise the following key infrastructure and components:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- Access roads, internal distribution roads and fencing around the development area.
- Two substation and BESS hubs, including:
  - Battery Energy Storage System (BESS)
  - Two (2) On-site facility substations, switching substations
- 132kV power line within a 300m wide corridor to facilitate the connection between the PV Facility and the authorised 400kV collector substation.
- O&M and laydown area hub, including:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Laydown areas and temporary construction camp area.

The full extent of the Development Area (~1818ha) and Development Footprint (~1350ha) for the solar facility, as well as the associated infrastructure was considered through the S&EIA process by the independent specialists and the EAP. On-site sensitivities were identified through the review of existing information, desktop evaluations and detailed field surveys. A development footprint for the PV facility within the development area was proposed by the developer through consideration of the sensitive environmental features and areas identified through the EIA process, and application of a mitigation hierarchy which aimed at avoidance as the first level of mitigation. **Figure 8.1** illustrates the Kotulo Tsatsi Energy PV3 facility development area, including the grid connection infrastructure.

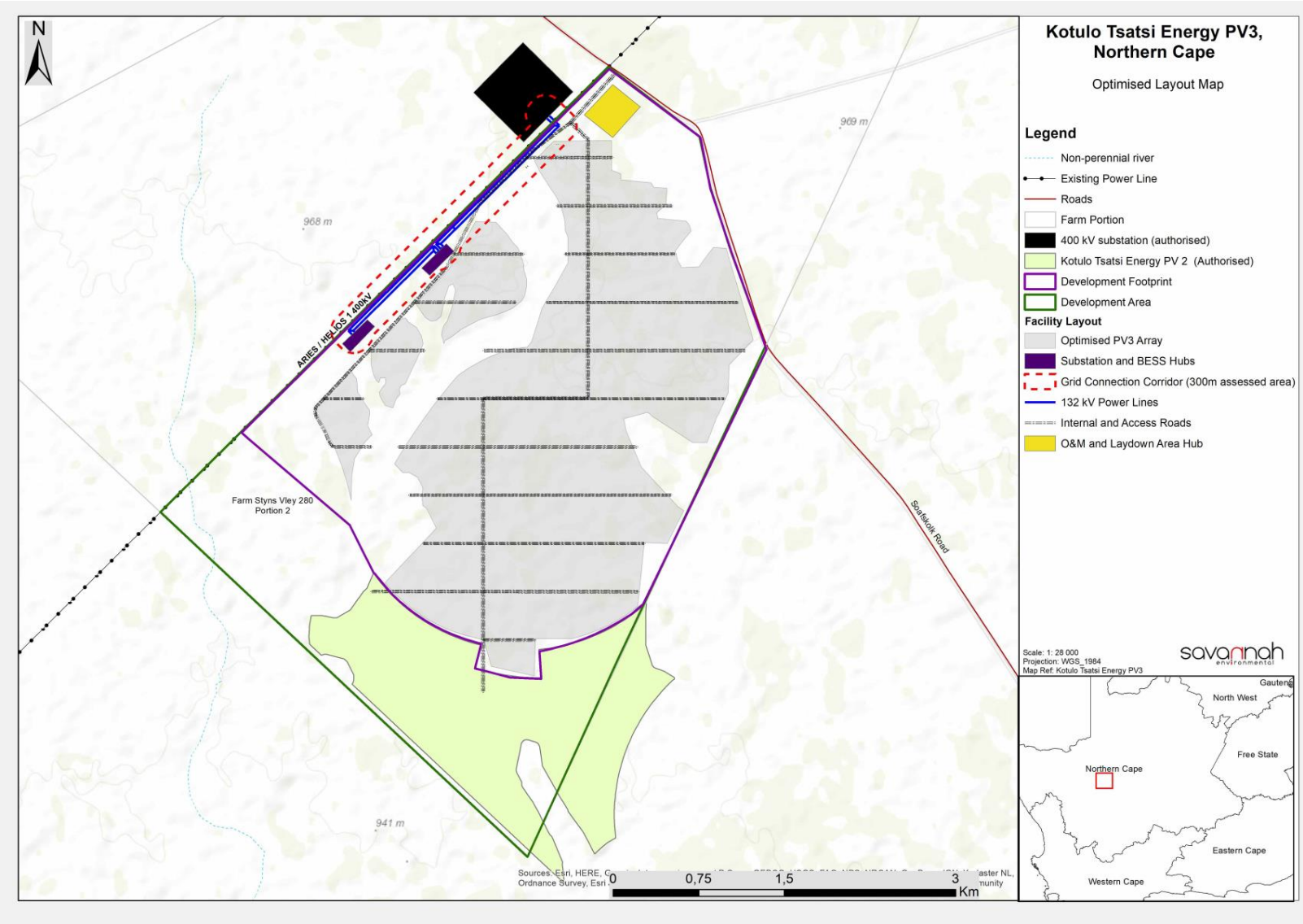

Figure 8.1: Map of the Kotulo Tsatsi Energy PV3 facility development area, infrastructure and grid connection corridor layout as assessed in the EIA process.

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

The development of the project will comprise the following phases:

» Pre-Construction and Construction – will include site preparation; establishment of access roads, construction camps, batching plant, laydown areas, and facility infrastructure; construction of foundations involving excavations and cement pouring; the transportation of components/construction equipment to the project site, manoeuvring and operating cranes for unloading and installation of equipment; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for the Kotulo Tsatsi Energy PV3 facility is dependent on the number of PV modules to be erected but is estimated to be up to 12 months.

» Operation – will include the operation of the Kotulo Tsatsi Energy PV3 facility which will feed the generated electricity into the national grid via the authorised 400kV substation (authorised as part of the CSP 3 facility (DFFE Ref. 14/16/3/3/2/694). The operation phase of the Kotulo Tsatsi Energy PV3 facility is expected to be approximately 25 years (with maintenance).

» Decommissioning – depending on the economic viability of the Kotulo Tsatsi Energy PV3 facility, the length of the operation phase may be extended beyond a 25-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. Therefore, these impacts are not considered separately within this chapter.

8.1. 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 the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Report.

Requirement	Relevant Section
3(1)(h)(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts (aa) can be reversed (bb) may cause irreplaceable loss of resources and (cc) can be avoided, managed or mitigated.	The impacts and risks identified to be associated with the construction and operation phases of the Project have been included in **Section 8.2.** Impact tables have been included for each field of study which considers the nature, significance, consequence, extent, duration and probability of the impacts, as well the reversibility of the impacts, the loss of resources and avoidance, management or mitigation, as expected at this stage in the S&EIA process.
3(1)(h)(vii) positive and negative impacts that the proposed	The positive and negative impacts associated with the

Requirement	Relevant Section
activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Project have been included in **Section 8.2.**
3(1)(h)(viii) the possible mitigation measures that could be applied and level of residual risk	Possible mitigation (specifically relating to the avoidance of sensitive areas) has been included in **Section 8.2** where possible to provide such recommendations at this stage in the S&EIA process.

8.2. Quantification of Areas of Disturbance on the Site

Site-specific impacts associated with the construction and operation of the Kotulo Tsatsi Energy PV3 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 soils. In order to assess the impacts associated with the PV Facility, it is necessary to understand the extent of the affected area.

» The PV Facility requires a development footprint of approximately 1350ha. This area includes infrastructure such as PV modules and mounting structures, inverters and transformers, temporary and permanent laydown areas, O&M and storage hub – including site offices and maintenance buildings, workshop areas for maintenance and storage, and site and internal access roads.
The grid connection solution includes a power line within a grid connection corridor (~3km long and 300m wide assessed corridor), and two substation and BESS hubs, each 2ha in extent (each including an on-site facility substation (footprint area up to 2ha in extent), switching substation (footprint area up to 2ha in extent) and BESS.

8.3. Potential Impact on Terrestrial Ecology

The impact of Kotulo Tsatsi PV 3 from a terrestrial ecology perspective has been assessed as Low, (refer to **Appendix D** – Terrestrial Ecology Compliance Statement for more details).

8.3.1 Results of the Terrestrial Ecology Impact Assessment

An initial site visit took place on 14 August 2016 when the proposed development was still a CSP facility, and the follow-up field assessment to verify and sample the current footprint took place on 12 December 2021. During the site visits, the different biodiversity features, habitat, and landscape units present at the site were identified and mapped in the field. Specific features visible on the satellite imagery of the site were also marked for field inspection and were verified and assessed during the site visit. Walk-through-surveys were conducted within representative areas across the difference habitats units identified and all plant and animal species observed were recorded on a GPS. The site is homogenous and open, with the result that any features present are easily observable and it is highly unlikely that there any species of significance or sensitive features that were observed during the site visit.

According to the DFFE Plant Species Theme, there are no plant species of concern that are known to occur in the immediate vicinity of the development footprint. No plant species of concern were observed during the field assessment, with the result that the sensitivity of the site can be confirmed to be low. There are

however severally provincially protected species present on the site including all *Aloe* species present, all *Amaryllidaceae*, all *Asclepiadaceae,* all *Iridaceae,* all *Mesembryanthemaceae* and any other species as listed in the Northern Cape Nature Conservation Act 9 of 2009. These species would require a permit to destroy or translocate should the project commence to construction.

The Kotulo Tsatsi Energy PV3 development is considered low sensitivity for fauna. There are no areas of the development area which are considered specifically high sensitivity for terrestrial fauna. As such, the Kotulo Tstatsi development area is considered acceptable for the development of the PV facility from a terrestrial fauna perspective.

8.3.2 *Description* of Terrestrial Ecology Impacts

Figure 8.3 indicates that there are two CBA 2 areas in close proximity to the PV arrays, however these areas have been avoided by the development footprint. The development footprint has been restricted to areas that are not classified as CBAs, ESAs or Northern Cape PAES Focus Areas, with the result that the development would not have a significant impact on these features.

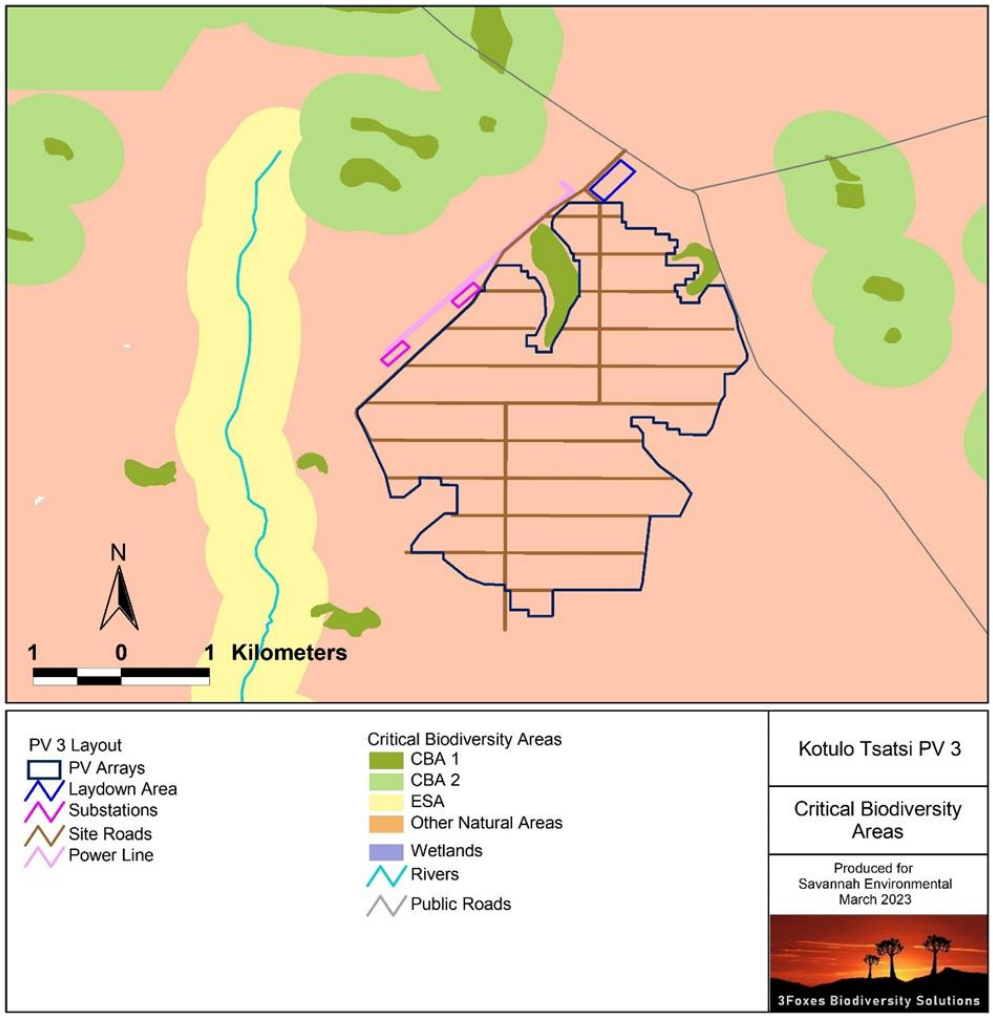

Figure 8.3 Critical Biodiversity Areas and ESAs for the Kotulo Tsatsi PV 3 project area, which is an extract of the Northern Cape CBA map

The sensitivity map (**Figure 8.4**) illustrates those areas that are considered to represent more sensitive areas from a general ecological perspective. It is important to note that these areas are not areas where SCCs have been observed, but rather habitats such as drainage features that are considered more vulnerable to disturbance due to their higher diversity or lower tolerance of disturbance due to their higher diversity or lower tolerance of disturbance. In response to this, a mitigated layout which takes cognisance of the mapped sensitivities and preserves the ecological functioning of landscape and is considered acceptable.

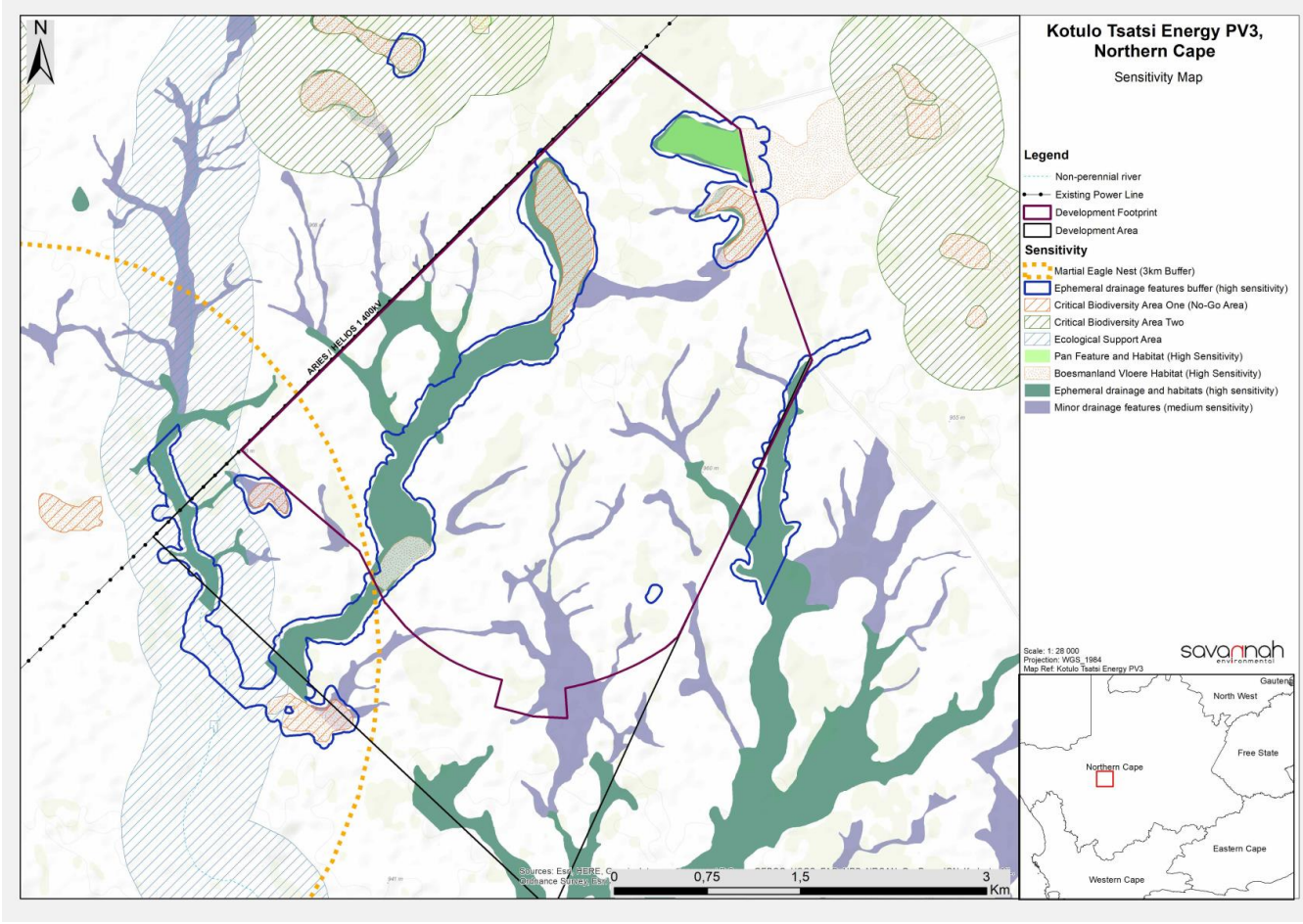

Figure 8.4 Sensitivity map for the Kotulo Tsatsi Energy PV3 optimised development footprint

8.3.3 Overall Result

The DFFE Screening Tool indicates that the Kotulo Tsatsi Energy PV 3 project site has a low sensitivity for Terrestrial Biodiversity Them, Plant Species Theme and Animal Species Theme, apart from some pan features present which are mapped as CBA1. Under the mitigated/optimised layout, these features have been avoided and the Kotulo Tsatsi Energy PV3 project is restricted to lower sensitivity areas. In addition, the field assessment was able to confirm the low sensitivity of the site and there are no significant vegetation or faunal features within the development footprint. The site does not lie within a NPAES Focus Area or a Strategic Water Resource Area (SWSA). The contribution of the current project to cumulative impact is considered to be relatively low given the low sensitivity of the features within the development footprint and the low level of transformation the broader area has experienced. The Terrestrial Biodiversity Theme

Compliance Statement (including Terrestrial Biodiversity, Animal Species Theme and Plant Species Theme) therefore finds that the footprint of the Kotulo Tsatsi Energy PV3 Facility is restricted to low sensitivity areas with no observed plant or animal species of conservation concern present, and as such, there are no reasons to oppose the Kotulo Tsatsi Energy PV3 Facility.

No fatal flaws are evident for the proposed facility in this location, and it is the opinion of the specialist that the project, may be favourably considered, on the condition that all prescribed mitigation measures and supporting recommendations are implemented.

8.4 Potential Impact on Avifauna

The development of the Kotulo Tsatsi Energy PV3 Facility is likely to result in a variety of impacts from an avifaunal perspective. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details).

8.4.1 Results of the Avifauna Impact Assessment

Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details). The avifaunal impacts associated with the development have been assessed on the facility layout which avoids all areas high avifauna sensitivity.

8.4.2 Description of Avifaunal Impacts

Density of Birds

From the 1-km transects, a mean 4.0 species/km in June 2016 was recorded. The total number of species recorded in all walking and driving surveys was 71, with 24% more species in the wet seasons (54 and 48 species) than the dry season (42 species).

In 2020, following seven years of almost continuous drought (Kosie Zandberg pers comm) it was not surprising that the 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.

The PV sites differed little with 5.7 species/km and 11.7 birds/km. One of these species (Sclater's Lark) is a *Near Threatened* and range-restricted endemic (Lloyd 2005). Only three birds were recorded in 2016, ~1.5-km southwest of the proposed PV1 site, and none in 2020, suggesting that they are rare and nomadic in the area.

In summary, very low numbers of birds were apparent during the drought years between 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.

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. This has implications for the placement of the PV sites: a site that avoids all dry river (drainage) lines will impact fewer small bird species and fewer birds. Therefore, open stony/grassy habitat is the better option for development.

Passage Rates of Birds

Passage Rates are a measure of the number of collision-prone Priority birds passing through a given Vantage Point area per hour.

From 213 hours of systematic observation from 18 VPs in 2014-2016 recorded 86 Priority birds were, giving a medium-low rate of 0.40 birds per hour. Ten of these 86 Priority birds were threatened Red Data species, of which seven (8%) were Martial Eagles. These birds were either perched on telephone poles (Photo 5b) or pylons or soaring over the pans in the south of the study area. Their passage rate was 0.03 birds per hour – a low rate.

In 2020 these Passage rates were even lower with no birds recorded flying over the PV3 and PV4 sites. This may be biased as the recorded observation hours were only 2.0 hours.

These low rates are a combination of drought and the death of the breeding Martial Eagle

Martial Eagles and Other Priority Species

Given that the primary concern arising from the first avian assessment of the Kotulo Tsatsi site was the presence of an active Martial Eagle nest on the boundary of the present Kotulo Tsatsi Energy PV3 site, a 3km buffer was recommended to reduce risk to the birds from development.

It must be noted that:

- The original buffer was 3km for the proposed CSP facility (a more dangerous design for birds than PV).
- The study was granted an Environmental Authorisation (so a change to the 3km buffer would be difficult to motivate).
- The present-day buffer recommendation based on tracking data (Dr G Tate) is 5.7-km for wind farms (not indicated for PV installations)
- The avian specialist is satisfied that a 3km buffer remains an adequate prevention, because:
    - PV facilities are more benign to birds than wind turbines or CSPs;
    - the 3km buffer should be sufficient to minimise habitat loss; and
    - the 3km buffer should be sufficient to reduce disturbance during construction.

This arises because the PV site will take habitat away from the foraging birds and cause disturbance to them during construction and operation. The proposed PV3 no longer overlaps this 3-km buffer and thus has served its purpose.

Vultures in the Proposed Kotulo Tsatsi Energy PV3 Site

A late addition to the avifauna that appeared in 2020 and again in 2021 was the arrival of over 100 White-backed Vultures, and a few Cape Vultures and Lappet-faced Vultures. All are Red Data species. These species often roosted on the power line towers and were sometimes close to the PV3 site.

Given the huge foraging range of vultures in general, and White-backed Vultures in particular, it is unlikely that the presence of a PV facility will negatively influence the vultures from a loss of foraging perspective.

It is also unlikely to adversely influence the roost site given that the vultures have used several sets of pylons over several kilometres in the months that they have been recorded on the Aries–Helios line. They were first recorded in the area in 2019 by conservation farmer Francois van der Merwe.

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

Construction phase Impact

Nature: Negative due to direct disturbance and loss of foraging habitat around the PV Facility site for the Red-listed bird groups identified as at risk above.
The Martial Eagle recorded on the PV facility site is the raptor species most likely to be impacted because of their high likelihood of occurrence and high proportion of flights over the area. The newly arrived Vultures are not expected to be affected.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term 4	Long-term 4
Magnitude	Minor (2)	Minor (1)
Probability	Improbable (2)	Improbable (2)
Significance	Low (14)	Low (12)
Status	Negative	Negative
Reversibility	Yes, once construction disturbance finished the birds are likely to return	Yes, areas around active nests avoided during construction
Irreplaceable loss of species?	No, Martial Eagles will return to the area. But that runs the risk that these birds too will be displaced	
Can impacts be mitigated?	Yes. If the high-risk areas are avoided within the 3-km eagle nest buffer development.	Yes. If all areas identified as sensitive are avoided for development

Mitigation measures:

- No development within the 3-km Martial nest buffer
- Reduce disturbance near active nests – build outside the breeding season.

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.

Operation Phase Impact

Nature: Negative due to direct impact fatalities, disturbance and loss of foraging habitat around the Kotulo Tstatsi PV3 site for the Red-listed bird groups identified as at risk above.
The Martial Eagle, recorded on the Kotulo Tsatsi Energy PV3 site are the raptors species most likely to be impacted because of their high likelihood of occurrence and high proportion of flights at BSA. White-backed Vultures are not expected to be negatively influenced in roosting or foraging strategies.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Small (1)
Probability	Probable 3	Improbable 2
Significance	**Low (21)**	**Low (18)**
Status	Negative	Negative
Reversibility	Yes, if solar development avoids areas identified as high-risk in the proposed SOLAR PV, and mitigation occurs in the remaining areas.	Yes, if solar development avoid areas identified as high-risk
Irreplaceable loss of species?	No, Martial Eagles will return to the area. But that runs the risk that these birds too will be killed by poisons or impact with lines or solar infrastructure.	
Can impacts be mitigated?	Yes. If the high-risk areas are avoided for development	Yes. If all areas identified as sensitive are avoided for development

Mitigation measures:

» Position the solar PV site outside the 3-km high-risk areas;

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.

Decommissioning Phase Impact

Nature: Negative due to direct disturbance and loss of foraging habitat around the PV site for the Red-listed bird groups identified as at risk above.
The Martial Eagles recorded on the Kotulo Tstatsi PV3 site are the raptors species most likely to be impacted because of their high likelihood of occurrence and high proportion of flights.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (1)
Probability	Improbable (2)	Improbable (1)
Significance	**Low (14)**	**Low (6)**
Status	Negative	Negative
Reversibility	Yes, if the veld is rehabilitated	Yes, if the habitat is rehabilitated
Irreplaceable loss of species?	No, Martial Eagles will return to the area. But that runs the risk that these birds too will be	

	poisoned by irresponsible people.	
Can impacts be mitigated?	Yes. If the high-risk areas are avoided for development.	Yes. If all areas identified as sensitive are avoided for development
Mitigation measures: • Reduce degree of disturbance and length of disturbance to a minimum during sensitive breeding periods.		

8.4.4 Overall Results

The Avifauna Impact Assessment identified that all impacts associated with the development of the Kotulo Tstatsi Energy PV3 development footprint will be of a low significance. No impacts of a high significance or fatal flaws are expected to occur with the implementation of the recommended mitigation measures.

8.5. Impacts on the Freshwater Resource Assessment

The development of the Kotulo Tstatsi Energy PV3 facility is likely to result in a variety of impacts, associated largely with the direct disturbance or impacts to freshwater features. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** for more details). The impacts on freshwater resources associated with the development have been assessed on the optimised facility layout which avoids all high sensitivity areas.

8.5.1 Results of the Freshwater Resource Assessment

Construction, operation and decommission will lead to direct and potential indirect loss of / or damage to freshwater resources. 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. Physical alteration to wetlands can have an impact on the functioning of those wetlands. Consequences may include:

» Increased loss of soil;
» Loss of/or disturbance to indigenous wetland vegetation;
» Loss of sensitive wetland habitats;
» Loss or disturbance to individuals of rare, endangered, endemic and/or protected species that occur in wetlands;
» Fragmentation of sensitive habitats;
» Impairment of wetland function;
» Change in channel morphology in downstream wetlands, potentially leading to further loss of wetland vegetation; and
» Reduction in water quality in wetlands downstream

8.5.2 Description of Freshwater Resource Assessment

Present Ecological status

The surface water resource features (wetlands, larger washes and drainage lines) have been assessed based on the three wetland driving processes (responsible for wetland formation and maintenance); Hydrology, Geomorphology and Water Quality as well as Vegetation Alteration (provides an indication of the intensity of human land use activities).

The results of the PES assessments are summarised in **Tables 8.1** and **Table 8.2** below.

Table 8.1: Summary results of the river IHI (Index of Habitat Integrity) assessment.

Freshwater Resource Feature	HABITAT COMPONENT		
	Instream PES Category with % Intact	Riparian PES Category with % Intact	Overall PES (weighted 60:40)
Major Ephemeral Washes	B: Largely Natural (89% intact)	B: Largely Natural (89% intact)	B: Largely Natural (89% intact)
Minor Ephemeral Washes	B: Largely Natural (86% intact)	B: Largely Natural (83% intact)	B: Largely Natural (85% intact)
Drainage Channels	A: Unmodified (94% intact)	B: Largely Natural (81% intact)	B: Largely Natural (89% intact)

Table 8.2: Results of Level 1 Wet-Health Assessment.

Hydro-geomorphic Unit	Hydrology	Geomorphology	Vegetation	Overall PES
Depression Wetlands: WT2, WT3, WT5, WT6, WT7	A: Natural/Unmodified (PES Score: 0)	A: Natural/Unmodified (PES Score: 0)	C: Moderately Modified (PES Score 2)	A: Natural/Unmodified (PES Score: 0.57)
Depression Wetland: WT1	D Largely Modified (PES Score: 4.5)	F Critically Modified (PES Score: 7.3)	F Critically Modified (PES Score: 6.2)	E Significantly Modified (PES Score: 6)
Depression Wetland: WT 4	C Moderately Modified (PES Score: 3.6)	D Largely Modified (PES Score: 5.2)	D Moderately Modified (PES Score: 3.3)	D Largely Modified (PES Score: 4)

Very little change has occurred to the hydrological and geomorphological characteristics of most of the freshwater resource features, apart from two wetland features which have been significantly impacted through historical cultivation and dam construction. The vegetation characteristics of all of these freshwater resource features have been impacted by grazing in the past and have allowed for some encroachment of especially *Rhigozum trichotomum* within the ephemeral wash and drainage systems and *Rosenia spinescens* within some portions of the depression wetland. Some of the smaller ephemeral washes as well as the "vloere" located within the larger ephemeral washes, contain old (historical) plough lines. It is unclear if these ploughing activities were an attempt to cultivate within the deeper soil profiles or if it was an attempt to facilitate vegetation establishment. Other, "minor" impacts include twin track crossings, farm fences, soil capping and sheet erosion. A few of the ephemeral washes to the north and east are crossed by the larger gravel access route.

Subsequently, the majority of these freshwater systems are still in a mostly natural, functional condition.

Wetland Ecological Importance and Sensitivity (EIS)

A summary of the EI&S importance assessment scores and ratings for wetlands is provided in **Table 8.3** (also refer to **Figure 8.5**).

Table 8.3: Score sheet for determining the ecological importance and sensitivity for the identified surface water resource features.

DETERMINANT		IMPORTANCE SCORES (0-4) AND RATINGS			
		Major Ephemeral Washes	**Minor Ephemeral Washes**	**Ephemeral Drainage Lines**	**Depression Wetland**
PRIMARY DETERMINANTS	Rare & Endangered Species	1	1	0	1
	Populations of Unique Species	2	1	0	2
	Species/taxon Richness	2	1	1	1
	Diversity of Habitat Types or Features	4	2	1	2
	Migration route/breeding and feeding site for wetland species	4	2	2	4
	Sensitivity to Changes in the Natural Hydrological Regime	3	2	3	3
	Sensitivity to Water Quality Changes	2	3	2	3
	Flood Storage, Energy Dissipation & Particulate/Element Removal	3	3	3	3
MODIFYING DETERMINANTS	Protected Status	1	1	1	1
	Ecological Integrity	4	3	4	4
TOTAL		26	19	17	24
MEDIAN		2.5	2	1.5	2.5
OVERALL ECOLOGICAL SENSITIVITY & IMPORTANCE		**B High**	**C Moderate**	**C Moderate**	**B High**

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 apart access roads. 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.

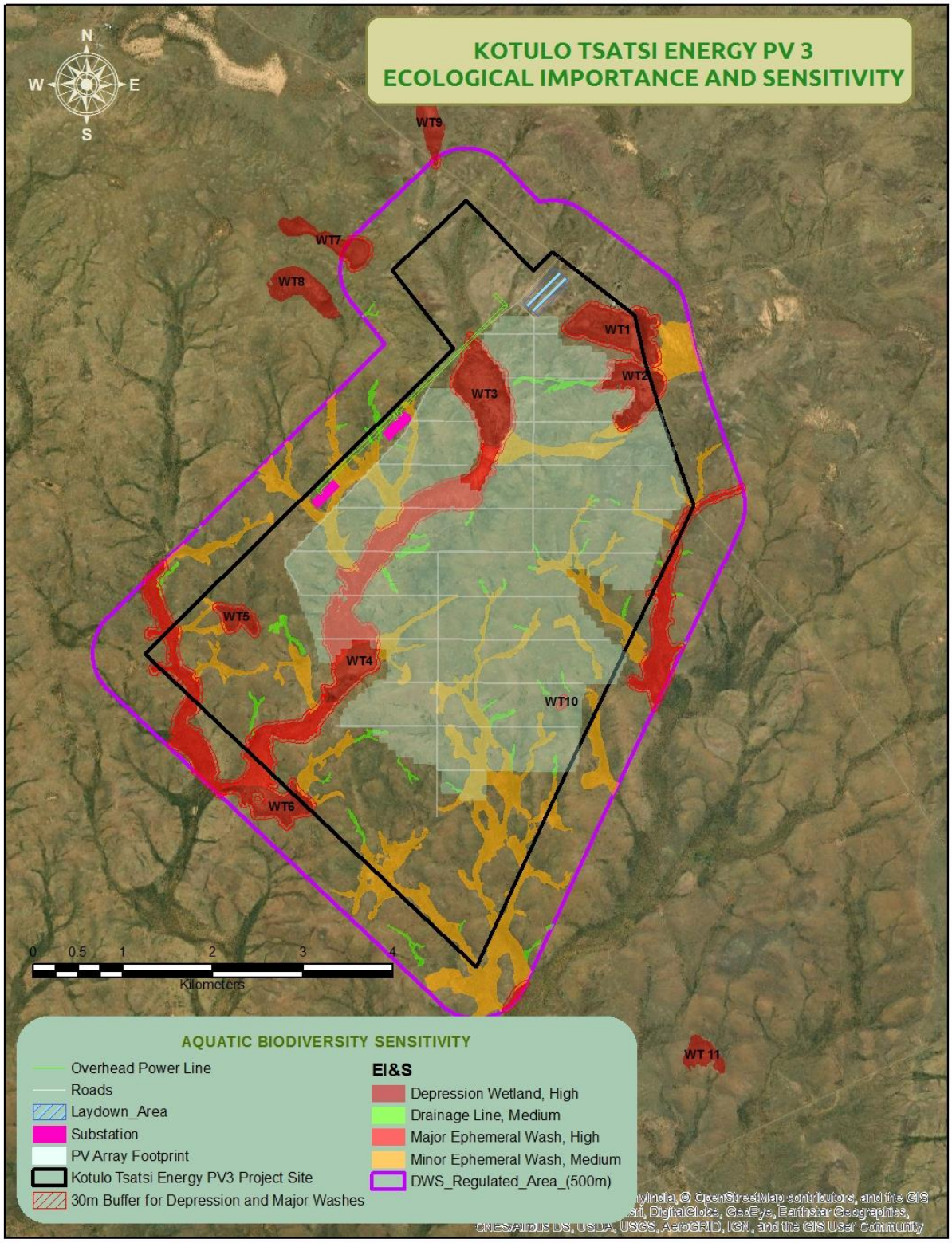

Figure 8.5: Aquatic biodiversity Importance and Sensitivity Map with recommended buffers

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

Impact 1: Loss of riparian systems and disturbance of the alluvial water courses during the construction, operation and decommissioning phase

Impact Nature: 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 & services;
- Reduction/loss of habitat for aquatic dependent flora & 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	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (70)**	**Medium (55)**
Status	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 highly sensitive areas and associated buffers.	

Mitigation measures:

- The highly sensitive 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.
- The recommended buffer areas between the delineated freshwater resource features and proposed project activities should be maintained.
- Vegetation within the medium sensitive freshwater resource features should 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 to be cleared.

» Vegetation clearing should occur in 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 should 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) should be applied in order to speed up the rehabilitation process in critical areas (e.g. steep slopes and unstable soils). » As mentioned, existing roads should 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 watercourse 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 minimise the loss of riparian vegetation (reduce footprint as much as possible). » All crossings over watercourses should be such that the flow within the channels is not impeded and should be constructed perpendicular to the river channel. » Where new roads need to be constructed, the existing road infrastructure should 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 operational /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 should 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) should 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 should coincide as far as possible to minimise the impact. » During decommissioning, disturbance to the freshwater ecosystems should 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
Residual Impacts » Locally altered vegetation structure, » Without the implementation of mitigation measures, possible impact on the remaining catchment due to changes in run-off characteristics in the development site.

Impact 2: Impact on riparian systems through the increase in surface runoff on riparian form and function during the operational and decommissioning phases

Impact Nature: The proposed PV Project will involve the addition of hardened areas through the establishment of solar panel foundations while some compaction of soils may occur due to site works. Service roads have the potential to further increase areas of hardening as do the temporary construction area. 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)	Probable (3)
Significance	**High (70)**	**Medium (33)**
Status	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 highly sensitive areas and associated buffers and through the implementation of an effective storm water management plan.	

Mitigation measures:

- The highly sensitive major ephemeral washes and their associated buffer areas should be regarded as No-Go areas for all construction activated 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 should be maintained.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to 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 should be allowed to persist as far as possible, with only the larger shrubs being trimmed.
- Infrastructure footprint and associated area of disturbance should 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 should be dissipated over a broad area covered by natural vegetation or managed using appropriate channels and swales.
- Storm water run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any storm water leaving the Solar PV site.
- The existing road infrastructure should be utilised as far as possible to minimise the overall disturbance
- Where new roads need to be constructed, the existing road infrastructure should be rationalised and any unnecessary roads decommissioned and rehabilitated in order to reduce total area of hardened, bare areas within the property.
- No stormwater runoff must be allowed to discharge directly into any water course along roads, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation.

Residual Impacts

- Altered streambed morphology.
- Due to the extent and nature of the development this residual impact is unlikely to occur.

Impact 3: Increase in sedimentation and erosion during the construction, operational and decommissioning phase

Impact Nature: 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 & 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 water courses during significant rainfall events. The study by Cook and McCuen (2013) found that the runoff from individual solar panels resulted in greater kinetic energy which 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)	Probable (3)
Significance	**Medium (56)**	**Low (24)**
Status	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 measures:

- The highly sensitive major ephemeral washes and their associated buffer areas should be regarded as No-Go areas for all construction activated 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 should be maintained.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to 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 should 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 should 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, should be revegetated with locally occurring species, to bind the soil and limit erosion potential.
- Site rehabilitation should aim to restore surface drainage patterns, natural soil and vegetation as far as is feasible.
- An erosion control management plan should be utilised to prevent erosion
- There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should 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).
- Storm water run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any storm

water leaving the Solar PV site.
» The existing road infrastructure should be utilised as far as possible to minimise the overall disturbance created by the proposed Solar PV Facility.
» Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas.
» Construction of gabions and other stabilisation features to prevent erosion, if deemed necessary.
» No stormwater runoff must be allowed to discharge directly into any water course along roads, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation.
» Containers carrying batteries (if present) should be regularly checked for leaks. If leaks are found, these containers should 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 Impacts:
Altered streambed morphology. Due to the extent and nature of the development this residual impact is unlikely to occur.

8.5.4 Overall Result

Impacts of a medium and high significance on aquatic resources have been identified to be associated with the development of the Kotulo Tsatsi Energy PV3 Facility. With the implementation of the mitigation measures, all impacts would be reduced to a moderate or low significance which is considered to be acceptable. There are no fatal flaws associated with the development footprint. Although there is limited footprint within the high sensitivity areas, this is associated with existing road alignments. Given the avoidance of sensitive features at the site by the facility layout no high impacts are likely to occur as a result of the development.

8.6 Assessment of Impacts on Land Use, Soil and Agricultural Potential

The impact of Kotulo Tsatsi PV 3 on the soils, land use, land capability and agricultural potential has been assessed as Very Low to Medium (refer to **Appendix G** – Agricultural Compliance Statement for more details).

8.6.1 *Results* of the Land Use, Soil and Agricultural Potential Assessment

According to the land type database (Land Type Survey Staff, 1972 - 2006) the assessment of the development area falls within the Fc137 land type (refer to **Figure 8.6**). The Fc land type consists of Glenrosa and/or Mispah soil forms with the possibility of other soils occurring throughout. Lime is rare or absent within this land type in upland soils but generally present in low-lying areas.

Five soils forms were identified within the project area, including the Augrabies, Mispah, Bare Rock, Clovelly and Prieska soil form. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low" to "Moderate" sensitivities, which correlates with the findings from the baseline assessment and the DFFE Screening Tool Report.

The baseline findings and the sensitivities as per the Department of Agriculture, Forestry and Fisheries (DAFF, 2017) national raster file concur with one another. It therefore is the specialist's opinion that the land capability and land potential of the resources in the development area ranges from "Very Low" to "Moderate" (**Figure 8.6**).

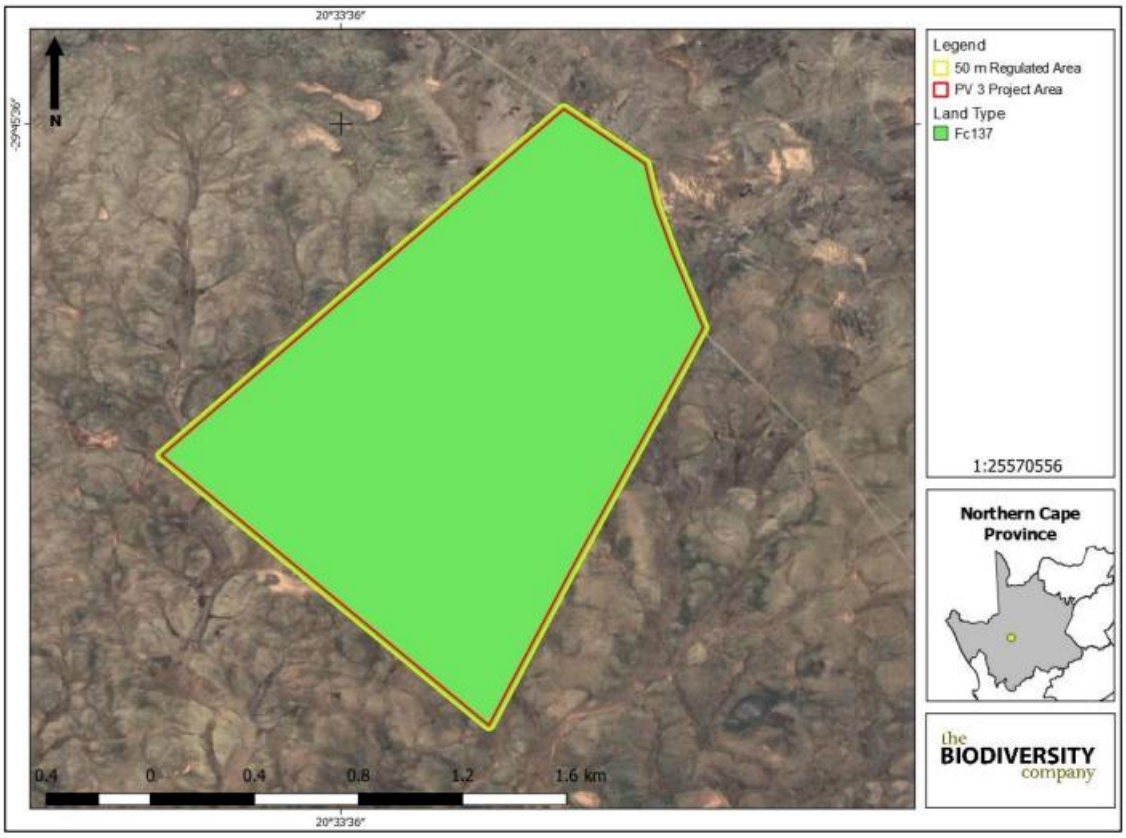

Figure 8.6 Land type present within the Kotulo Tsatsi Energy PV3

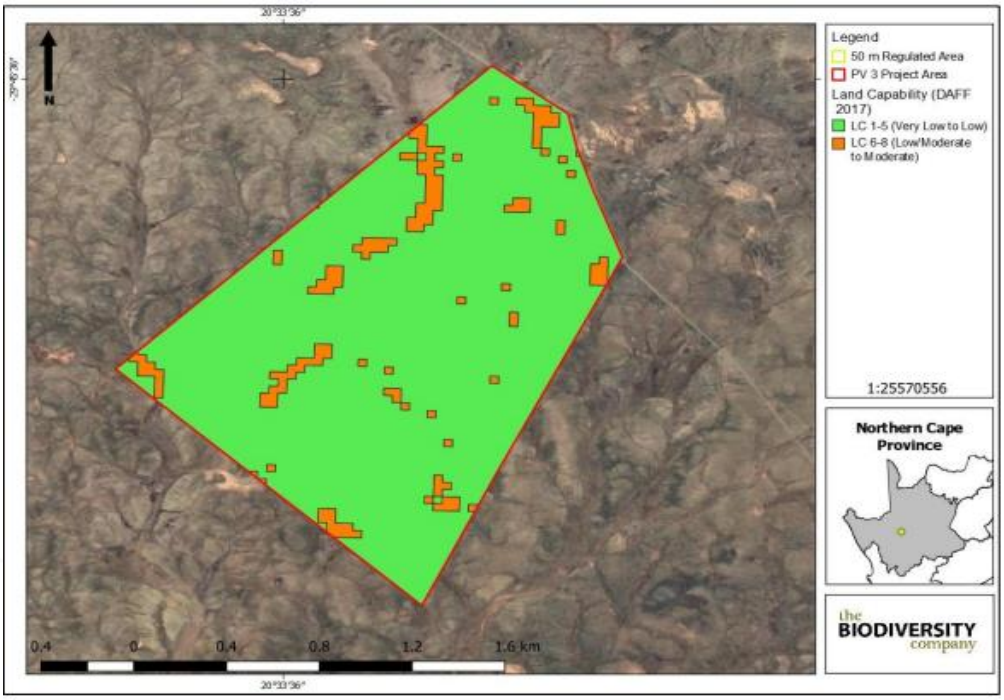

Figure 8.7 Land capability sensitivity (DAFF, 2017)

According to the National Web based Environmental Screening Tool, the proposed development is located within a "very low" and "moderate" sensitivity land capability area. The protocols for minimum requirements (DEA, 2020) stipulates that in the event that a proposed development is located within "Low" or "Medium" sensitivities, an agricultural compliance statement will be sufficient. After acquiring baseline information pertaining to soil resources within the 50 m regulated areas, it is the specialist's opinion that the soil forms and associated land capabilities concur with the sensitivities stated by the screening tool. Therefore, only an agricultural compliance statement was compiled. No impacts were identified, and no mitigation measures are applicable.

8.6.2 Overall Results

No "High" land capability sensitivities were identified within the project area. Considering the relatively low sensitivities, it is the specialist's opinion that the proposed activities will have an acceptable impact on agricultural productivity. Furthermore, no measures in regard to moving components in their micro-setting were required to avoid or minimise fragmentation and disturbances of agricultural activities. Therefore, it is the specialist's opinion that the proposed activities may proceed as have been planned without the concern of loss of high sensitivity land capabilities or agricultural productivity.

8.7. Assessment of Heritage Impacts

Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G**).

8.7.1. Results of the Heritage Impact Assessment

Archaeology
The area proposed for the development of the Kotulo Tsatsi PV 3 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.

Despite detailed inspection of the dolerite outcrops, no engravings were found. Furthermore, the generally low density of artefacts found on the farms was notable. As found by Van der Walt in 2014, the regular distribution of sparse artefacts and isolated finds can be detected across the entire study area but dense site concentrations are virtually absent and, in this case, even the dolerite outcrops offered only moderately dense artefact scatters. The dolerite outcrops here are much smaller than the major ones in neighbouring areas containing engravings and no perennial streams or rivers are found here. Based on the evidence, it does not appear that the study area was used extensively during the Stone Age.

Palaeontology
Desktop analysis of the fossil records of the various sedimentary rock units underlying the development area, combined with field assessment of numerous representative rock exposures within and close to the development area, indicate that all of these 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. Two palaeontological sites are present within the assessed development area have been assessed in previous studies does not recommend any mitigation in terms of impact to these resources.

Table 8.4: Observations from the field assessments and sites from SAHRIS for the Kotulo Tsatsi Energy PV3

POINT ID	Site Name	Description	Co-ordinates		Grading	Mitigation
KT PV 008	KT PV3	Heavily patinated hornfels flake, retouched on dorsal surface, MSA	-29.79803	20.57236	NCW	None
KT PV 009	KT PV3	Concrete tanks, windmill, kraal complex	-29.79322	20.56573	NCW	None
KT PV 010	KT PV3	Earthen dam wall, broken midway	-29.79708	20.56044	NCW	None
KT PV 021	KT PV3	Historic glass, metal and porcelain, small discard area	-29.79288	20.55617	NCW	None
KT PV 022	KT PV3	Quartzite flake, MSA	-29.77824	20.55976	NCW	None
KT PV 023	KT PV3	Patinated hornfels flakes, MSA	-29.77628	20.56864	NCW	None
KT PV 024	KT PV3	Hornfels flake, MSA	-29.78024	20.57773	NCW	None
KT PV 025	KT PV3	Quartzite flake, hooked end, MSA	-29.78589	20.58086	NCW	None
KT PV 026	KT PV3	Hornfels flake, MSA	-29.78728	20.59101	NCW	None
KT PV 027	KT PV3	Hornfels flake, MSA	-29.78002	20.5846	NCW	None
KT PV 028	KT PV3	Hornfels flakes, MSA	-29.77149	20.58445	NCW	None
90937	KT PV3	Palaeo- 010 - Artificial pit excavated into weathered, calcretised Prince Albert Fm mudrocks, Steyns Vlei 280	-29,798778	20,560417	IIIC	None
90942	KT PV3	Palaeo-Wolmaransstad75MWSEF 011 - Small surface exposure of Prince Albert Fm near dam, calcrete-veined, Steyns Vlei 280	-29,797639	20,561139	IIIC	None
90943	KT PV3	Palaeo-Wolmaransstad75MWSEF 012 - Platy surface gravels overlying Prince Albert Fm nr Valsvlei homestead, Steyns Vlei 280	-29,768639	20,584833	IIIC	None
90945	KT PV3	Palaeo-Wolmaransstad75MWSEF 013 - Platy surface gravels and calcrete overlying Prince	-29,777944	20,559667	IIIC	None

		Albert Fm nr transmission line, Steyns Vlei 280				

8.7.2. Impact tables summarising the significance of socio-economic impact during construction, operation and decommissioning (with and without mitigation measures)

NATURE: It is possible that buried archaeological and palaeontological resources may be impacted by the proposed development				
		Archaeology		**Palaeontology**
MAGNITUDE	L (1)	No significant archaeological resources were identified within the development area.	L (1)	Although no palaeontological resources were identified within the development area, the palaeontological sensitivity of the study area is rated as low by Almond (2015).
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Localised within the site boundary	L (1)	Limited to the development footprint
PROBABILITY	L (1)	It is extremely unlikely that any significant archaeological resources will be impacted	I (2)	It is improbable that significant fossils will be impacted by excavations that are greater than 1m deep
SIGNIFICANCE	L	**Low (7)**	**L**	**Low (14)**
STATUS		Neutral		Neutral
REVERSIBILITY	L	Any impacts to heritage resources that do occur are irreversible	L	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	L	Unlikely	H	Unlikely
CAN IMPACTS BE MITIGATED		Yes		Yes
MITIGATION: All excavations into bedrock are monitored by the ECO and governed by the Chance Fossil Finds Procedure				
RESIDUAL RISK: 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.				

8.7.3 Overall Result

All of the impacts of the Kotulo Tsatsi Energy PV3 Facility from a heritage perspective are of a low significance. No impacts of a high significance are expected to occur, and no fatal flaws are associated with the development from a heritage perspective.

8.8 Assessment of Visual Impacts

Negative impacts on visual receptors will occur during the undertaking of construction activities and the operation of the Kotulo Tsatsi Energy PV3 facility. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I)**.

8.8.1 Results of the Visual Impact Assessment

The result of the viewshed analyses for the proposed facility is shown on **Figure 8.8.** The viewshed analyses was undertaken from a number of vantage points within the proposed development area at an offset of 6m above average ground level. This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures (PV panels) associated with the facility.

The combined results of the visual exposure, viewer incidence / perception and visual distance of the proposed PV facility is indicated on **Figure 8.8**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged to calculate the visual impact index.

The criteria which inform the visual impact index are:

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

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

The index indicates that potentially sensitive visual receptors within a 1km radius of the PV facility 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.

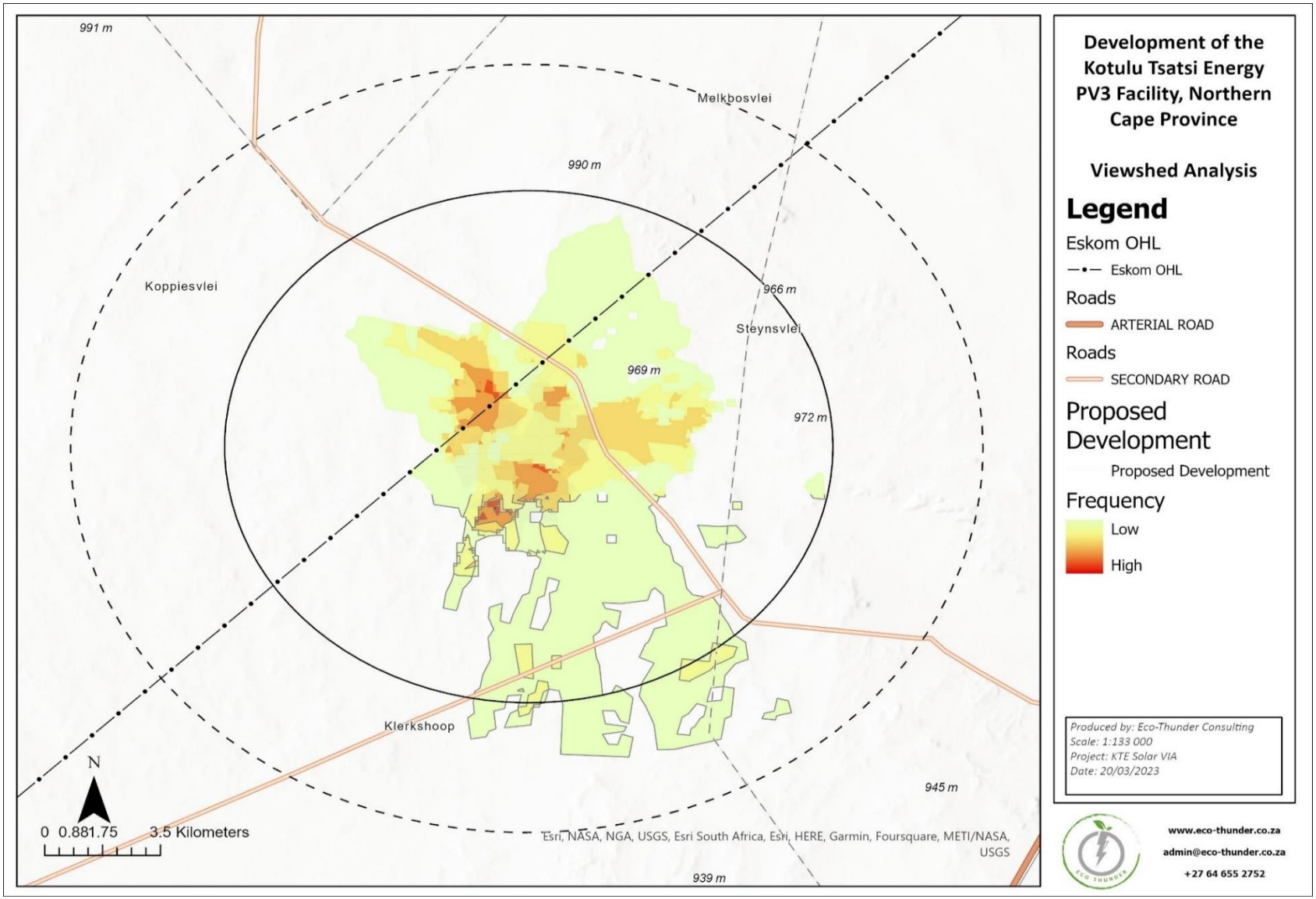

Figure 8.8 Viewshed analysis of the proposed Kotulo Tsatsi Energy PV3

Magnitude of the potential visual impact

0 – 1km (**Very High sensitivity area**)

The main project components are anticipated to fall within this area, the anticipated visual exposure of the facility is contained to a core area on the site itself and within a 1 km radius thereof. There is only one farm, which is located on the same property as the proposed development within this zone. The gravel road falls directly northeast of the development within this zone. Observers travelling along this road will be exposed to the project infrastructure. In addition, the existing Aries-Helios OHL runs to the north of the facility.

1 – 3km (**High Sensitivity**)

Potential visual exposure in the short to medium distance (i.e., between 1 and 3km), is largely very scattered with the most line of sight being from the additional stretches of the gravel road.

3 – 6km (**Moderate Sensitivity**)

Within this observation the visual exposure becomes very scattered and interrupted some additional settlements and additional roads falling within this zone of observation.

6 – 10km(**Very Low Sensitivity**)

At distances exceeding 6km the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (development) and the observer.

It is clear that the relatively constrained dimensions of the PV facility would amount to a fairly limited area of potential visual exposure. The visual exposure would largely be contained within a 6km radius of the proposed development site.

8.8.2 Description of Visual Impact

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, inter alia: the purpose and need for the Project; views and concerns of interested and affected parties (I&APs); social and political norms, and the public's interest.

The results are based on worst-case scenario when the impacts of all aspects of the Project are taken together (PV facilities, grid connection and battery systems). Consequence of impact is a function of intensity, duration, and spatial extent (SLR 2020). Intensity of impact is taken from the worst-case situation. These facilities are rated together, from a visual impact perspective, as the one would not exist without the other and they must be understood as the collective / cumulative.

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

Construction Phase Impacts

Nature: The clearing of vegetation and exposure of soil during the establishment period will contrast dramatically with the natural layout of the site's vegetation. Once the solar PV arrays have been installed, they will also contrast with the existing landscape due to their dark appearance.		
The development of the proposed solar power plants will require approximately 1350ha of land. The preparation (earthworks and infrastructure development) will cause a major local contrast with the existing open land, as soil is exposed to create service roads, trenches, erecting structures for the arrays, distribution lines, sub-stations, etc.		
	Prior to Mitigation	***Post Mitigation/Enhancement Measures***
Duration	Short (2)	Short (2)
Extent	Very Short Distance (4)	Very Short Distance (4)
Magnitude	Moderate (4)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Moderate (48)**	**Low (30)**
Mitigation/Enhancement Measures		
» Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint. » Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible. » Plan the placement of laydown areas and temporary construction equipment camps 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 to reduce lighting impacts. » Rehabilitate all disturbed areas (if present / if required) immediately after the completion of construction works.		
Residual Risks: The visual impact will be removed after decommissioning, provided the solar PV infrastructure is removed and the site is rehabilitated to its original (current) status. Failing this, the visual impact will remain.		

Nature: Impact *of PV facility on Roads in Close Proximity*		
The Solar PV facility could potentially have a **moderate** visual impact on road users travelling along the main road traversing south and east of the facility. These roads are however expected to be frequented primarily by local users going about their daily business (i.e., not sight-seeing), potentially lessening the probability of the impact significance.		
	Prior to Mitigation	**Post Mitigation**
Prior to Mitigation		
Duration	Long term (4)	Local (4)
Extent	Local (4)	Long Term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significane	**Moderate (42)**	**Low (24)**

Mitigation/Enhancement Measures

Mitigation:

Mitigation of this impact is possible and both specific measures as well as general "best practice" measures are recommended to reduce / mitigate the potential visual impact to **low**. The table below illustrates this impact assessment.

General mitigation / management:

Planning:

- Retain and maintain natural vegetation in all areas outside of the development footprint.

Operations:

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

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the
- facility.
- Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Site specific mitigation measures:

» Plant indigenous vegetation where possible to increase the sense of place of the area.

Residual Risks:

The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed and the site is rehabilitated to its original (current) status. Failing this, the visual impact will remain.

Nature: *Visual Impact on Residence and Homesteads in Close Proximity*

The potential visual impact on residents of homesteads and homes in close proximity to the Solar PV facility is expected to be of **Low** significance after mitigation. The residences in question include the property owners farming development, as well as very scattered small holdings within the area.

	Prior to Mitigation	**Post Mitigation**
Prior to Mitigation		
Duration	Long term (4)	Long term (4)
Extent	Local (4)	Local (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (24)**

Mitigation/Enhancement Measures

Mitigation:

General mitigation/management:

Planning:

- Retain and maintain natural vegetation in all areas outside of the development footprint.

Operations:

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

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the facility.
- Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Site specific mitigation measures:

- Ensure that site is rehabilitated after construction
- Where possible incorporate indigenous vegetation to improve the sense of place

Residual Risks:

If development is not rehabilitated or left abandoned the sense of place will decrease, which may decrease the value of properties in the surrounding area.

Operation Phase Impacts

Nature: *Glint and Glare*		
Potential visual impact of solar glint and glare as a visual distraction and possible air / road travel hazard The visual impact of glint and glare relates to the potential it has to negatively affect sensitive visual receptors in relatively close proximity to the source (e.g., residents of neighbouring properties), or road users driving at night. The potential visual impact related to solar glint and glare as a hazard is expected to be of **low** significance. No mitigation of this impact is required since the PV facility is not expected to interfere with aircraft operations or impact the safety of road users.		
	Prior to Mitigation	**Post Mitigation**
Duration	Long term (4)	N/A
Extent	Very short distance (2)	N/A
Magnitude	Low (1)	N/A
Probability	Probable (4)	N/A
	Low (28)	N/A
Mitigation/Enhancement Measures		
Mitigation: N/A		
Residual Risks: Potential visual impact of night lighting during the construction phase on the nightscape of the region.		

Nature: *Visual Exposure*		
Visual exposure is determined by qualifying the visibility of an object, with a distance rating to indicate the degree of intrusion and visual acuity. As distance between the viewer and the object increases, the visual perception of the object reduces exponentially as generally changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance. The basic areas of concern are: • The residential areas surrounding the Project site.		
	Prior to Mitigation	**Post Mitigation**
Duration	Long term (4)	Long term (4)
Extent	Local (4)	Local (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Moderate (36)**	**Low (24)**
Mitigation/Enhancement Measures		
Mitigation: **General mitigation/management:** Planning: • Retain and maintain natural vegetation in all areas outside of the development footprint. Operations: • Maintain the general appearance of the facility as a whole. Decommissioning: • Remove infrastructure not required for the post-decommissioning use of the facility. • Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. • Monitor rehabilitated areas post-decommissioning and implement remedial actions. **Site specific mitigation measures:** • Plant vegetation barriers where plausible for the PV facility in order to shield the structures from observers residing at the above-mentioned homesteads.		

Residual Risks:
None

Nature: *Visual intrusion*		
Visual intrusion deals with the notion of contextualism i.e., how well does a Project component fit with or disrupt / enhance the ecological and cultural aesthetic of the landscape as a whole? And ties in with the concept of visual absorption capacity (VAC), which for the Project site is **low**.		
	Prior to Mitigation	**Post Mitigation**
Duration	Long term (4)	N/A
Extent	Local (2)	N/A
Magnitude	Moderate (4)	N/A
Probability	Probable (3)	N/A
Significance	**Low (30)**	N/A
Mitigation/Enhancement Measures		
Mitigation: N/A		
Residual Risks: • A possibility for the area to become more ''industrialized'' if large amounts of PV facilities are constructed.		

Nature: *Construction of Ancillary Infrastructure*		
On-site ancillary infrastructure associated with the PV facility includes a grid connection solution, which consists of an on-site facility and power line/s to facilitate the connection between the solar PV Facility, an authorised 400kV collector substation, which is located north-east of the project site. In addition, the development will include a Battery Energy Storage System (BESS) and all associated infrastructure), 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.		
	Prior to mitigation	**Post mitigation**
Prior to Mitigation		
Duration	Long term (4)	N/A
Extent	Local (4)	N/A
Magnitude	Low (4)	N/A
Probability	Improbable (2)	N/A
Significance	**Low (24)**	N/A
Mitigation/Enhancement Measures		
Mitigation: N/A		
Residual Risks: In the event that the development deviates from the proposed layout complications may arise, ensure that the gridline solution is kept as short as possible and that all additional infrastructure is within the development area.		

Impact: Sense of place

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), plays a significant role.

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

The environment surrounding the proposed PV facility has a predominantly rural and undeveloped character. 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 and the lack of features of value.

	Prior to mitigation	**Post mitigation**
Prior to Mitigation		
Duration	Long term (4)	N/A
Extent	Regional (3)	N/A
Magnitude	Low (4)	N/A
Probability	Improbable (2)	N/A
Significance	**Low (22)**	N/A
Mitigation/Enhancement Measures		
Mitigation: N/A		
Residual Risks: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.		

8.8.4 Overall Results

The findings of the Visual Impact Assessment undertaken for the proposed 480MW PV facility is that the visual environment surrounding the site, especially within a 1 - 3km radius, may be visually impacted during the anticipated operational lifespan of the facility (i.e., a minimum of 25 years).

In order to better understand the visual impacts associated with the proposed development on receptor locations in the surrounding areas, a visual contrast assessment has been undertaken. This is done in order to quantify the degree of visual contrast or change that would be caused by the proposed ash disposal facility at certain key observation locations.

Empirical research indicates that the visibility of a PV facility and hence the severity of visual impact, decreases as the distance between the observer and the tower increases. The landscape type, through which the development crosses, can be mitigated through the topographical or vegetative measures.

Visual receptors within 1 km from the alignment are most likely to experience the highest degree of visual intrusion, hence contributing to the severity of the visual impact. This is considered as the zone of highest visibility after which the degree of visual intrusion decreases rapidly at distances further away.

The anticipated visual impacts range from moderate to low significance. 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 PV facility. Considering all factors, it is recommended that the development of the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management programme.

8.9. Assessment of Social Impacts

Positive and negative impacts on the social environment may occur as a result of the proposed project. Potential social impacts and the relative significance of the impacts associated with the development of the Kotulo Tsatsi Energy PV3 facility are summarised below (refer to **Appendix J**).

8.9.1 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).

The proposed development supports the social and economic development through enabling skills development and training in order to empower individuals and promote employment creation within the area. The development would mainly focus on economic benefits to the area and other dimensions of impacts such as influx of jobseekers into the local area will need to be weighed.

The findings of a previous study which considered the development of renewable energy projects in this area indicated that the development of such projects would make a notable positive economic impact on the local economies of the Hantam LM due to the increase in construction activities in the area and the demand created for various services. It is anticipated that the local unemployment rates would notably decline during the construction period. The Project could create much needed employment opportunities in the area and will contribute to the overall objective of national government of diversifying energy sources in the country and improving energy security. The positive socio-economic impacts that are associated with the Project include skills development in the respective industries, increase in government revenue, improved livings standards of households who will benefit from created employment, as well as long-term injections into the local economies through Socio-Economic Development (SED) and Enterprise Development (ED) commitments during operations. The site is located away from a town, and workers would be required to be housed locally.

8.9.2 Description of Social Impacts

The majority of social impacts associated with the Kotulo Tsatsi Energy PV3 facility are anticipated to occur during the construction phase of the development and are typical of the type of social impacts generally associated with construction activities. These impacts will be temporary and short-term (~12 months) but could have long-term effects on the surrounding social environment if not planned or managed appropriately. It is therefore necessary that the detailed design phase be conducted in such a manner so as not to result in permanent social impacts associated with the ill-placement of project components or associated infrastructure or result in the mismanagement of the construction phase activities.

Potential Social Impacts during the Construction Phase include:

Potential positive impacts
» Creation of employment opportunities, Business opportunities and opportunities for skills development and training

Potential negative impacts
» In- migration or potential influx of job seekers
» Nuisance impacts
» visual impacts

Potential Social Impacts during the Operation Phase include:

Potential positive impacts
» The establishment of the renewable energy infrastructure and generation of clean and renewable energy.
» Creation of local employment and business opportunities, skills development, and training

Potential negative impacts
» The visual impacts and associated impact on the sense of place

Potential Social Impacts during the Decommissioning Phase include:

Potential negative impacts
» Opportunities for short-term employment in deconstruction
» Restoration of sense of place due to reduction of noise and visual impacts

8.9.3 Impact tables summarising the significance of socio-economic impact during construction, operation and decommissioning (with and without mitigation measures)

Construction Phase Impacts

***Nature: The creation* employment opportunities and skills development**

Impact description: The creation of employment opportunities and skills development opportunities during the construction phase for the country and local economy		
	Prior to Enhancement	***Post Enhancement***
Duration	Short-term (2)	Short-term (2)
Extent	Local- Regional (3)	Local- Regional (3)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Highly Probable (4)
Significance	**Medium (40)**	**Medium (45)**

Enhancement measures:

To enhance the local employment, skills development and business opportunities associated with the construction phase, it is recommended that the following measures be considered for implementation:

- Adoption of a local employment policy to maximise the opportunities made available to the local labour force. The Kotulo Tsatsi (Pty) Ltd should make it a requirement for contractors to implement a 'locals first' policy, especially for semi and low skilled job categories.
- Enhance employment opportunities for the immediate local area, i.e., Hantam Local Municipality. If this is not possible, then the broader focus areas should be considered for sourcing workers.
- The recruitment selection process must seek to promote gender equality, consideration must be given to women during the process.
- It is recommended that realistic local recruitment targets be set for the construction phase.

Residual Risks:

The residual impacts associated with the creation of employment, business opportunities and training during the construction phase is that the workers can improve their skills by gaining more experience, improve quality of life and economic growth for small-scale entrepreneurs.

Nature:

Migration from jobseekers and population changes.

Impact description: Added pressure on economic and social infrastructure during construction as a result of in-migration of people to the region		
	Prior to Mitigation	**Post Mitigation**
Duration	Short-term (2)	Short-term (2)
Extent	Local (2)	Local (2)
Magnitude	Low (4)	Minor (2))
Probability	Medium Probability (3)	Improbable (1)
Significance	**Low Negative (24)**	**Low Negative (12)**

Mitigation:

- In collaboration with the municipality and local community leaders, create and implement a recruitment protocol. Make certain that the procedures for applying for jobs are clearly communicated.
- Create and implement a local procurement policy that prioritizes "locals first" to prevent people from migrating to the area in search of work.
- Prior to construction, engage with local community representatives to facilitate the adoption of the "locals first" procurement policy.
- Provide workers with transportation (from towns such as Kenhardt, Brandvlei, and others) so that they can easily access their place of employment and do not need to relocate closer to the site.
- Prevent the recruitment of workers at the site.
- Create and implement a grievance procedure.
- Appoint a Community Liaison Officer (CLO) to assist with local labour procurement.
- Implement a method of communication in which procedures for lodging complaints are laid out so that the local community can express any complaints or grievances about the construction process.
- Establish clear access rules and regulations for the proposed site.
- Appoint a security company and put in place appropriate security procedures to ensure that

employees do not remain on the premises after working hours.

» Inform local community organizations and law enforcement forums about construction activities, times, and duration.

Residual Risks:

Possibility of outside workers remaining in the neighbourhood after construction is completed and subsequent pressures on local infrastructure.

***Nature*:** Potential noise, dust, and safety impacts associated with construction-related activity movement and traffic movement to and from the site

Impact description:

The Soakskolk road and the R27 will be used more frequently, and the slow-moving construction and delivery vehicles may cause the intersection to be more unsafe.

	Prior to Mitigation	**Post Mitigation**
Duration	Short-term (2)	Short-term (2)
Extent	Local (2)	Local (2)
Magnitude	Moderate (6)	Low (4)
Probability	High Probability (4)	Probable (3)
Significance	**Medium (36)**	**Low (21)**

Mitigation:

» During the construction phase, working hours should ideally be limited to daylight hours. Where a change in working hours is required, the relevant authorities must approve it, and surrounding landowners must be notified.

» All vehicles must be roadworthy, and drivers must be licensed, follow traffic rules, adhere to speed limits, and be made aware of potential road safety issues.

» The EPC contractor should inspect construction vehicles on a regular basis to ensure their roadworthiness.

» For the duration of the construction period, it is necessary to establish traffic warning signs and control measures that are adequate and strategically located along the R27 and gravel access roads, including the Soafskolk road. At all times, but especially at night, warning signals must be seen.

» Ongoing communication with landowners and road users during construction period.

» It is necessary to create communication lines between the EPC contractor and the impacted and nearby landowners. A Community Liaison Officer should be recruited to carry out the suggested grievance mechanism.

» To allow the local community to voice any issues or grievances over the construction process, a mechanism of contact with clear processes for filing complaints should be created.

» Dust suppression measures must be implemented on un-surfaced roads, such as wetting on a regular basis and ensuring that vehicles used to transport building materials are fitted with tarpaulins or covers.

» Before construction begins, hold informational seminars to ensure that the nearby communities are fully informed about the project that will be produced in its finished form. This needs to be done via the Community Liaison Officer (CLO).

Residual Risks:

If damage to local roads is not repaired, it will affect other road users and result in higher maintenance costs. The costs will be borne by road users who were not at fault for the damage.

Operation Phase Impacts

Nature: **Job creation during operation**.		
Impact description: The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy		
	Prior to Enhancement	***Post Enhancement***
Duration	Long term (4)	Long-term (4)
Extent	Local -Regional (3)	Local - Regional (3)
Magnitude	Low (4)	Low (4)
Probability	Medium Probable (3)	High Probable (4)
Significance	**Medium Positive (28)**	**Medium Positive (32)**
Enhancement measures: » It is recommended that a local employment policy is adopted by the Project Developer to maximise the project opportunities made available to the local community. Enhancement of employment opportunities for the immediate local area, HLM, if this is not possible, then the broader focus areas should be considered for sourcing employees. » The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. » Wherever practicable, vocational training programs ought to be implemented to support employee skill development. » Proof of skills development must be provided to the upskilled and individual.		
Residual Risks: Improved pool of skills and experience in the local area		

Nature: **Development of clean, renewable energy infrastructure.**		
Impact description: Development of clean, renewable energy infrastructure		
	Prior to Enhancement	***Post Enhancement***
Duration	Long term (4)	N/A
Extent	Local – Regional -National (4)	N/A
Magnitude	Minor (2)	N/A
Probability	Highly Probable (4)	N/A
Significance	**Medium Positive (40)**	N/A
Enhancement measures: None anticipated		
Residual Risks: Reduce carbon emissions through the use of renewable energy and contributing to efforts to reduce global warming		

Nature: **Visual impacts and impacts on sense of place**		
Impact description: Visual impacts and sense of place impacts associated with the operation phase of the Project		
	Prior to Mitigation	***Post Mitigation***
Duration	Long term (4)	N.A. – Mitigation not possible.
Extent	Local (2)	N.A. – Mitigation not possible.
Magnitude	Low (4)	N.A. – Mitigation not

		possible.
Probability	Highly probable (4)	N.A. – Mitigation not possible.
Significance	**Low Negative**	**N.A. – Mitigation not possible**
Mitigation: In order to successfully reduce the visual impact and the influence on sense of place during the operating phase of the planned project, it is advised that the recommendations provided in the Visual Impact Assessment (Specialist study) be followed in this regard.		
Residual Risks: The Kotulo Tsatsi Energy PV3 infrastructure will be visible until it is completely decommissioned and removed. Following that, the impact will be removed.		

Decommissioning Phase Impacts

Nature: **Loss of income and employment**		
Impact description: Loss of income and employment		
	Prior to Mitigation	***Post Mitigation***
Duration	Medium term (4)	Short (1)
Extent	Local (2)	Local 2
Magnitude	High (8)	Moderate (6)
Probability	Medium Probable (2)	Medium Probable (2)
Significance	**Medium (18)**	**Medium**
Mitigation: » During the decommissioning phase, retrenchment packages should be made available to all staff being retrenched. » Kotulo Tsatsi energy PV3 should be dismantled and removed from the site. Funds should also be set aside for rehabilitation and the closure of Kotulo Tsatsi energy PV3.		
Residual Risks: No residual impacts		

8.9.4 Overall Result

The social impacts identified will be either of a low or medium 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 PV3. 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. 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.

8.10. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e., no-go alternative) is the option of not constructing the Kotulo Tsatsi Energy PV3 facility. Should this alternative be selected, there would be no environmental impacts on the site or to the surrounding local area due to the construction and operation activities of a solar facility. All baseline information provided in this report relates to the current situation on site and in the surrounding area and can be considered the no-go alternative. Impacts are limited to the status quo. All negative impacts, specifically related to the development of the solar facility and associated infrastructure, discussed in this report will not materialise. In addition, positive impacts identified to be associated with the project will be foregone.

a) Land use and agriculture

According to the Agricultural Specialist "*The arid climate of the study area coupled with shallow soils limits the agricultural potential to low intensity grazing".* Therefore, the implementation of the 'do-nothing' alternative would leave the land-use restricted to the current agricultural activities, losing out on the opportunity to generate renewable energy from solar energy as additive thereto (i.e. current agricultural activities would continue). 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 project site which allows the current land-use activities to continue.

The 'do nothing' alternative would result in a lost opportunity for the landowners (in terms of implementing a compatible land use option, while still retaining the current land use) and the country (in terms of renewable energy). From this perspective the no-go alternative is not preferred when considering land use and agricultural potential of the project site.

b) Socio-economic impact

Social: The impacts of pursuing the no-go alternative are both positive and negative as follows:

Potential negative social impacts associated with the construction and operation of the project include the following:

- Potential influx of job seekers and an associated change in population and increase in pressure on basic services.
- Potential safety and security impacts.
- Potential impacts on daily living and movement patterns.
- Potential nuisance impacts (noise and dust).
- Potential visual impact and impact on the sense of place.

Potential positive social impacts associated with the construction and operation of the project include the following:

- Potential direct and indirect employment opportunities.
- Skills development and training
- Development of Renewable energy facilities
- Potential economic multiplier effect.

The impacts of pursuing the "no-go" alternative can therefore be summarised as follows:

- The benefits would be that there is no disruption from nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- There would also be an opportunity loss in terms of limited job creation, skills development, community upliftment and associated economic business opportunities for the local economy. This impact is considered to be negative.
- The opportunity to strengthen the grid connection within the municipal area would be lost which will have a negative impact on economic growth and development and therefore result in negative social impacts.

The No-Development option would mean that the electricity generated through renewable sources, in this case solar energy, is not generated and fed into the national electricity grid. In the given and described policy context, this would represent a negative social and environmental cost.

In addition, the employment opportunities associated with the construction and operational phase, as well as the benefits associated with the additional funding for socio-economic and enterprise development measures and the established local ownership entity representing beneficiary communities would be forgone.

c) Conclusion

As the project site experiences ample solar resource and optimal grid connection opportunities are available, not developing the Kotulo Tsatsi Energy PV3 would see such an opportunity being lost. As current land use activities can continue on the project site once the project is operational, the loss of the land to this project during the operation phase is not considered significant. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with the Kotulo Tsatsi Energy PV3 Facility. All impacts associated with the project can be mitigated to acceptable levels. If the PV facility is not developed the following positive impacts will not be realised:

- Job creation from the construction and operation phases.
- Economic benefit to participating landowners due to the revenue that will be gained from leasing the land to the developer.
- Meeting of energy generation mix in a most economic and rapid manner.
- Provision of clean, renewable energy in an area where it is optimally available.

As detailed above, the 'do-nothing' alternative will result in a number of lost opportunities. The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of the Kotulo Tsatsi Energy PV3 Facility.

CHAPTER 9: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 8, the Kotulo Tsatsi Energy PV3 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 DMRE, under the REIPPP Programme, released in 2011 a request for proposals (RFP) to contribute towards Government's renewable energy target and to stimulate the industry in South Africa. The REIPPP Programme has been rolled out in bid windows (rounds) over the past 11 years, 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 and socio-economic development contributions by the project 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. It is, therefore, important to follow a precautionary approach in accordance with NEMA to ensure that the potential for cumulative impacts[24] 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 the other known or proposed PV facility projects within the area.

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 PV3 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 PV3 facility within the project site being considered for the development:

- Unacceptable loss of threatened or protected vegetation types, habitat or species through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning.
- Unacceptable risk to water resources through disturbance associated with construction activities and increased runoff and erosion during the operation phase.
- Unacceptable risk to avifauna through habitat loss, displacement, collision and interaction with power infrastructure;
- Unacceptable loss of heritage resources.
- Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion.

[24] Cumulative impacts in relation to an activity are defined in the Environmental Impact Assessment Regulations (Government Notice R326) as the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

» 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-I)**.

Figure 9.1 indicates the location of the Kotulo Tsatsi Energy PV3 facility in relation to all other known and viable PV facilities (i.e. projects with a valid Environmental Authorisation) located within a radius of 30km from the project site. These developments were identified using information available in the public domain at the time of this assessment.

There are two (2) authorised PV facilities located adjacent to the project site, as well as one (1) CSP facility (refer to **Figure 9.1** and **Table 9.1**). All authorised projects have the same applicant. The potential for cumulative impacts is summarised in the sections that follow and has been considered within the specialist studies (refer to **Appendices D – J**).

1. Kotulo Tsatsi Energy PV1 (located immediately east of the site)
2. Kotulo Tsatsi Energy PV2 (located immediately south of the site)
3. Kotulo Tsatsi Energy CSP3 (located immediately west of the site)

It should be noted that not all the PV facilities presently under consideration by various solar energy developers will be built for operation. Not all proposed developments will be granted the relevant permits by the relevant authorities (DFFE, DMRE, NERSA and Eskom) 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.

As there is therefore a level of uncertainty as to whether all the above-mentioned PV facilities will be implemented, this results in it being difficult to quantitatively assess the potential cumulative impacts. The cumulative impacts of other known PV facilities in the broader area and the Highveld Solar PV Facility are therefore qualitatively assessed in this Chapter.

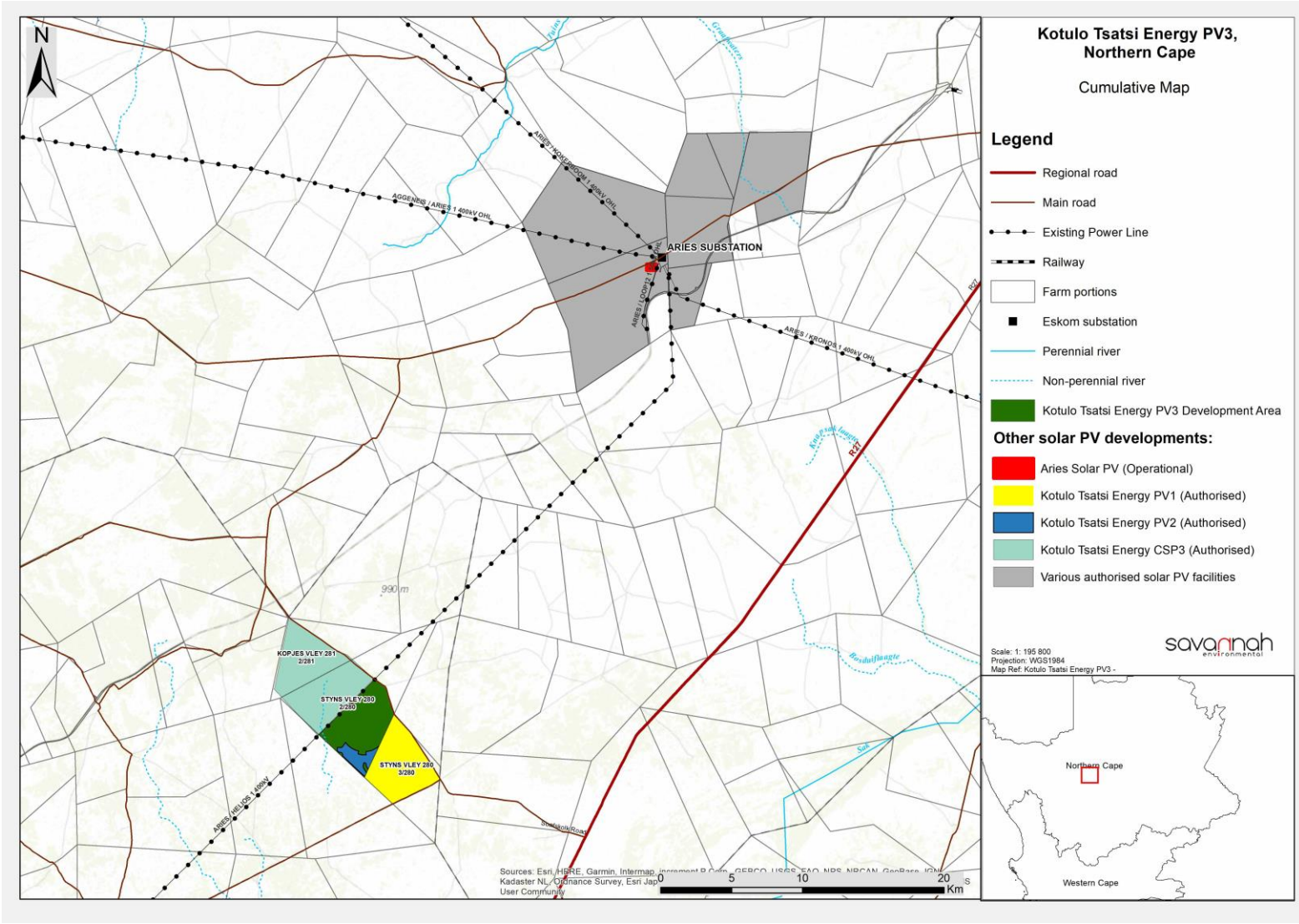

Figure 9.1: Cumulative map of similar large-scale energy developments within a 30km radius

9.2 Cumulative Impact on Ecology

In terms of cumulative impacts in and around the site, there are no built PV facilities in the immediate vicinity and the only existing facilities in the area are the PV plants at the Aries Substation northeast of the site. Apart from the current facility, there are two other approved PV facilities which are part of the current PV cluster at Kotulo Tsatsi, each with a footprint of approximately 300ha. Therefore, there is the potential for approximately 1000ha of PV development at the Kotulo Tsatsi site. While this would be a significant node of development, the wider area is still largely undeveloped and the Kotulo Tsatsi node would not significantly impact the availability of the affected vegetation types and habitats. As such, the contribution of the Kotulo Tsatsi PV 3 Facility to cumulative impacts and habitat loss in the area is considered acceptable.

9.3 Cumulative Impact on Avifauna

Cumulative impacts from an avifauna perspective include displacement and loss of habitat. In addition, the grid connection (via overhead power lines) of these facilities could potentially contribute towards bird strikes with powerlines and avian mortalities due to collision in the region.

The cumulative avifauna impacts, considering the development of San Solar PV and the PV facilities within the surrounding area will be of a low to high significance, depending on the impact being considered.

9.3 Cumulative Impact on Freshwater

Cumulative impacts on freshwater have been identified for Kotulo Tsatsi Energy PV3 (refer to **Appendix F**). All existing (authorised) renewable energy projects located adjacent to the Kotulo Tsatsi Energy PV3 were taken into account. 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 PV3 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 (1)	Local / downstream (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (4)	Moderate (6)
Probability	Improbable (2)	Probable (3)
Significance	**Low (18)**	**Medium (39)**
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.

9.4 Cumulative impacts on Heritage Resources

From a heritage perspective it is not anticipated that the development will have a negative impact on any significant cultural landscape in the area due to the existing similar infrastructure here. Furthermore, it is often preferred to have development such as PV facilities clustered in one area to mitigate the sprawl of this infrastructure across otherwise pristine landscapes. It is unlikely that the proposed Kotulo Tsatsi Energy PV3 project will result in unacceptable risk, unacceptable loss, whole-scale changes to the sense of place or unacceptable increase in impact due to its location as one of many renewable energy facilities in this area.
The heritage cumulative impacts associated with Kotulo Tsatsi Energy PV3 will be of a low significance.

Nature: *Cumulative impact to the sense of place*		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (4)	Low (4)
Duration	Medium term (3)	Long term (4)
Magnitude	Low (1)	Low (1)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Medium (27)**
Status (positive or negative)	Neutral	Neutral
Reversibility	High	Low
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	N/A	
Mitigation: » No impacts are anticipated and as such, no mitigation is required.		

9.5 Cumulative Visual impacts

The cumulative impact of the Project, the facilities and infrastructure taken together, is significant, along with the existing power infrastructure that exists in close proximity to the project site. Intervisibility for the proposed Project and the existing infrastructure would be evident. The Visual Absorption Capacity for the study area is relatively low, and the combined effect over time of these developments would result in the

study area being impacted upon in a moderate manner beyond the anticipated negative impacts of the proposed Project alone.

The cumulative visual impact significance of the Kotulo Tsatsi Energy PV3, seen together with the Kotulo Tsatsi Energy PV1 and Kotulo Tsatsi Energy PV2, as well as the other proposed and approved solar farms within 30km radius, was considered to be moderate during the operational phase and very low after the decommissioning phase, assuming mitigation. The reasons for this is the remoteness of the subject area and the featureless nature of the landscape.

Nature of Impact: The potential cumulative visual impact of the PV facility on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation (with mitigation)	***Cumulative impact of the project and other projects within the area (with mitigation)***
Extent	Short distance (3)	Medium to longer distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (3)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (30)**	**Low (30)**
Status (positive, neutral, or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	
Generic best practise mitigation/management measures: Planning: » Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint where possible. 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.		
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.		

9.6 Cumulative Social impacts

The Kotulo Tsatsi Energy PV3 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 Kotulo Tstatsi PV3 project, will also create a number of socio-economic opportunities for the Hantam Local Municipality. Positive cumulative opportunities include job creation, skill development and training, and downstream business opportunities. The potential cumulative benefits for the local and regional economies are therefore associated with both the construction and operation phases of renewable energy projects and associated infrastructure and span a 20-25-year period. However, steps must be taken to increase employment opportunities for members of the surrounding communities and to support skill development and training programs.

Nature: **An increase in employment opportunities, skills development and business opportunities with the establishment of more than one solar power facility.**		
Impact description: Employment opportunities		
	Overall impact/benefit of the proposed project considered in isolation	***Cumulative impact/benefit of the project and other projects in the area***
Duration	Short term (2)	Long term (4)
Extent	Local-Regional (3)	Local-Regional (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Definite (5)
Significance	**Medium (44)**	**High (65)**
Mitigation: » 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 job opportunities, skill development, business opportunities, and SED, where these opportunities are localized. The positive effects will be amplified if local employment policies are implemented, and local service providers are tapped by developers to maximize project opportunities for the local community.		
Residual Risks: » 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		

While the development of a single solar power project may not result in a large influx of people, the development of several projects at the same time may have a cumulative effect on in-migration and movement of people. Additional pressure on municipal services and housing is another potential impact of in-migration to the area; however, this impact will need to be addressed in the municipal IDP process and considerations. Controlling an influx of people into a region is extremely difficult, especially in a country with high unemployment rates. To reduce the possibility of such an impact occurring, it is critical that project proponents implement and strictly adhere to a local employment policy.

Nature: **Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area**.		
Impact description: Large scale in migration		
	Overall impact/benefit of the proposed project considered in isolation	***Cumulative impact/benefit of the project and other projects in the area***
Duration	Short term (2)	Long term (4)
Extent	Local (2)	Local-Regional (3)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (21)**	**Medium (39)**
Mitigation: » Create a recruitment policy / process (to be implemented by contractors) for sourcing labour locally. » Collaborate with government agencies to ensure that service delivery is in line with local development needs. » Create and implement a recruitment protocol in collaboration with the municipality and local community leaders. » Ensure that the procedures for applying for jobs are clearly communicated.		
Residual Risks: » Possibility of outside workers remaining in the area after construction is completed, putting additional strain on local infrastructure, services, and poverty issues		

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Nature: **Visual impact and impact on the sense of place and landscape character.**		
Impact description: large scale in migration		
	Overall impact/benefit of the proposed project considered in isolation	***Cumulative impact/benefit of the project and other projects in the area***
Duration	Short term (2)	Long term (4)
Extent	Local (2)	Local-Regional (3)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (21)**	**Medium (39)**
Mitigation: » To prevent deterioration of the area and its sites and an impact on the visual quality of the region, maintain and manage the facilities to be in excellent and orderly state. » Apply the appropriate mitigation strategies as advised by the Visual Impact Assessment.		
Residual Risks: » The visual impact will remain until the infrastructure is completely decommissioned and removed. Thereafter the impact will be removed.		

9.7 Conclusions regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development Kotulo Tsatsi Energy PV3 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 following conclusions can be drawn regarding the cumulative impacts associated with the project:

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes) due to the development of the Kotulo Tsatsi Energy PV3 Facility and other renewable energy facilities within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to wetland features/ephemeral watercourses with the development of the Kotulo Tsatsi Energy PV3 Facility and other renewable energy projects within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of the Kotulo Tsatsi Energy PV3 Facility and other renewable energy projects within the surrounding area. The cumulative impact is therefore acceptable.
- There will be no unacceptable loss of land capability due to the development of the Kotulo Tsatsi Energy PV3 Facility and other renewable energy projects within the surrounding areas. The cumulative impact is therefore acceptable.

- There will be no unacceptable loss of heritage resources associated with the development of the Kotulo Tsatsi Energy PV3 Facility and other renewable energy projects within the surrounding areas. The cumulative impact is therefore acceptable.
- Change to the sense of place and character of the area is expected with the development of renewable energy facilities. However, the change is not considered to be significant.
- No unacceptable socio-economic impacts are expected to occur. The cumulative impact is therefore acceptable.

The significance of the cumulative impacts associated with the development of Kotulo Tsatsi Energy PV3 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 Energy PV3 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
Agricultural	Low	Low
Avifauna	Low	Low
Freshwater Resources	Low	Medium
Heritage	Low	Low
Visual	Low	Low
Socio-Economic	Low to Medium (depending on the impact being considered)	Medium to high (depending on the impact being considered)

Based on the specialist cumulative assessment and findings, the development of the Kotulo Tsatsi Energy PV3 Facility and its contribution to the overall impact of all renewable energy facilities to be developed within a 30km radius, it can be concluded that the Kotulo Tsatsi Energy PV3 Facility cumulative impacts will be of a medium to low significance, with impacts of a high significance relating to positive socio-economic impacts. It was concluded that the development of the Kotulo Tsatsi Energy PV3 Facility 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 PV3) 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 10.1**). The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 480MW. The facility will be located within the farm Portion 2 of Farm Styns Vley 280. The PV facility is planned to be located within an area previously authorised for CSP project infrastructure[25], which is adjacent to the authorised Kotulo Tsatsi Energy PV1 and PV2 Facilities as well as the authorised CSP3 facility and associated infrastructure. 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.

The PV facility is planned to be located adjacent to the authorised Kotulo Tsatsi Energy PV1 and Kotulo Tsatsi Energy PV2 facilities, 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. A development area[26] of ~ 1888ha was defined through the Scoping evaluation of the site and has now been assessed for the facility footprint. The development footprint[27] has an extent of ~1350ha.

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 2 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 132kV grid connection solution to the authorised 400kV collector substation located on Portion 2 of Farm Styns Vley 280, and will comprise on-site switching substations, facility substations and a 132kV power line within a 500m wide corridor.

Infrastructure associated with the solar PV facility contracted capacity of up to 480MW will include:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- Access roads, internal distribution roads and fencing around the development area.
- Two substation and BESS hubs, including:
  - Battery Energy Storage System (BESS)
  - On-site facility substations, switching substations

25

26 The development area is that identified area (located within the project site) where the Kotulo Tsatsi Energy PV3 facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~1834ha in extent.

27 The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for Kotulo Tsatsi Energy PV3 is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

» 132kV power line within a 300m wide corridor to facilitate the connection between the PV Facility and the authorised 400kV collector substation.
» O&M and laydown area hub, including:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Laydown areas and temporary construction camp area.

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 PV3 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 PV3 set to inject up to 480MW_{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 PV3.

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 PV3 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 PV3 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 PV3 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 activity and the preferred location of the activity is

Requirement	Relevant Section
	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 PV3 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 should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether Kotulo Tsatsi Energy PV3 should be authorised has been included in section 10.5.

10.2 Evaluation of Kotulo Tsatsi Energy PV3 Facility

The preceding chapters of this report together with the specialist studies contained within **Appendices D - I** provide a detailed assessment of the potential impacts that may result from the development of proposed Kotulo Tsatsi Energy PV3. This chapter concludes the environmental assessment of Kotulo Tsatsi Energy PV3 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 highly sensitive features within the project site by the development footprint and the undertaking of monitoring, as specified by the specialists.

The potential environmental impacts associated with PV3 identified and assessed through the EIA process include:

- Impacts on ecology, including 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.
- Social impacts.

The findings of the environmental assessment are summarised below:

10.2.1 Impacts on Ecology

The Terrestrial Ecology Assessment (**Appendix D**) determined that there are no impacts associated with the Kotulo Tsatsi Energy PV3 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 flora or fauna, or disrupt any broader scale movement corridors for fauna. Also, the development footprint is positioned outside of any CBAs, ESAs and Northern Cape-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 PV3 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 PV3 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 Avifauna

The Avifaunal Assessment (**Appendix E**) determined that the Kotulo Tsatsi Energy PV3 site held very low species richness and abundance of priority collision-prone birds or Red Data species. This suggests the suitability for PV development. Furthermore, the development area of Kotulo Tsatsi Energy PV3 lies outside the 3km Martial Eagle nest site buffer, and will reduce the impacts of habitat loss for future breeding Martial Eagles. The anticipated avifauna impacts listed with mitigation is low significance. Therefore, if recommendations and mitigations are followed, there is no objection to the development of the Kotulo Tsatsi Energy PV3.

10.2.3 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 along with their associated 30m buffer areas, are regarded as No-Go areas for development of the Kotulo Tsatsi Energy PV3 facility. The minor ephemeral washes and drainage lines located within the current development footprint is not regarded as no-go areas for the placement of infrastructure.

With the implementation of the mitigation measures, all impacts would be reduced to a moderate or low significance which is considered to be acceptable. There are no fatal flaws associated with the development footprint. Although there is limited footprint within the high sensitivity areas, this is associated with existing road alignments. Given the avoidance of sensitive features at the site by the facility layout no high impacts are likely to occur as a result of the development.

Based on the outcomes of this study it is the specialists considered opinion that the proposed Kotulo Tsatsi Energy PV3 project can be authorised from a freshwater resource perspective.

10.2.4 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 (refer to **Appendix G**). 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.

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 PV3 development footprint (**Appendix H**). The impact significance was determined to be of low significance with mitigation, where required.

Although the proposed development lies in a geological area of high palaeontological sensitivity, the conditions on the ground are such that the actual palaeontological sensitivity is low. As such, it is unlikely that the proposed development will negatively impact on significant palaeontological heritage on condition that the Chance Fossil Finds Procedure (provided in **Appendix H**) is implemented during excavation activities.

The specialist study recommended that the proposed Kotulo Tsatsi Energy PV3 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**) undertaken determined that the visual environment surrounding Kotulo Tsatso Energy PV3, especially within a 1 - 3km radius, may be visually impacted during the anticipated operational lifespan of the facility.

The anticipated visual impacts listed with mitigation range from medium to low significance. 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 PV3 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 impacts identified will be either of a low or medium 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 PV3. 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. 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.

10.2.8 Assessment of Cumulative Impacts

Based on the specialist cumulative assessment and findings (**Appendix D** to **Appendix J** and Chapter 9 of the EIA), the development and its contribution to the overall impact of all renewable energy facilities to be developed within a 30km radius, it can be concluded that the Kotulo Tsatsi Energy PV3 Facility cumulative impacts will be of a medium to low significance, with impacts of a high significance relating to positive socio-economic impacts. It was concluded that the development of the Kotulo Tsatsi Energy PV3 Facility will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

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 PV3. Areas or features of very high to high sensitivity identified are as follows:

- Critical Biodiversity Areas are regarded as no-go areas for development.
- Very High sensitivity ephemeral drainage lines and habitat, and pan features habitat are regarded as no-go areas for development and 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 from a freshwater perspective.
- Boesmansland Vloere Habitat is of high sensitivity and considered to be no-go areas for development and must be avoided as far as possible.
- The 3km buffer around the inactive Martial Eagle nest is considered to be no-go areas for development and must be avoided as far as possible.
- High ecologically sensitive washes dominated by *Rhigozum trichotomum*. These areas are 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.

Where these features are avoided by the facility layout as the mitigation measure, impacts on the identified sensitive areas can be avoided (i.e. adequately managed). This is discussed in further detail in Section 10.4.

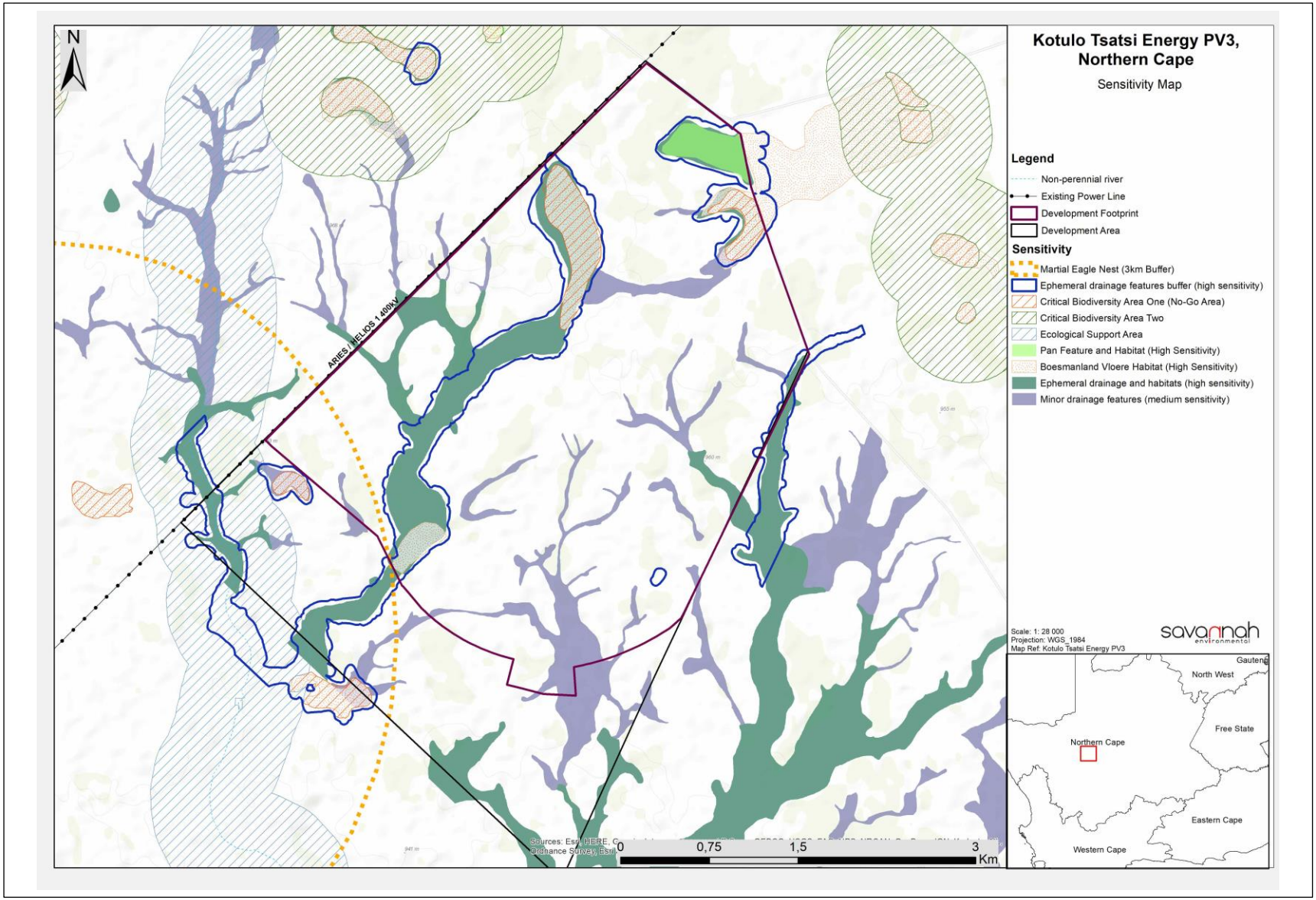

Figure 10.1: Environmental sensitivity map of the development area.

10.3 Optimisation of Layout: Mitigation Strategy

In response to the identified need to adequately manage impacts within sensitive areas identified on the site development footprint, and in order to demonstrate the commitment of the project to adhere to recommended mitigation measures, the project developer has developed a best practice mitigation strategy with regards to the facility layout.

The optimised development footprint was designed by the project developer in order to respond to and avoid the sensitive environmental features located within the development area. This approach ensured the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate and offset), which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the development area (located within the project site). With the implementation of the optimised layout, the development footprint is suitable and appropriate from an environmental perspective for Kotulo Tsatsi Energy PV3, 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** and **Figure 10.3**), and represents a positive outcome in terms of impact reduction and mitigation and the optimal layout for the facility. As such, the impact of this Optimised Final Layout is considered to be acceptable and preferred.

The EIA recommendations have been taken into account by the project developer, and the facility layout has been refined to avoid the following:

- Freshwater features buffer associated with the central ephemeral drainage line
- Critical Biodiversity Areas 1
- The 3km buffer around the inactive Martial Eagle

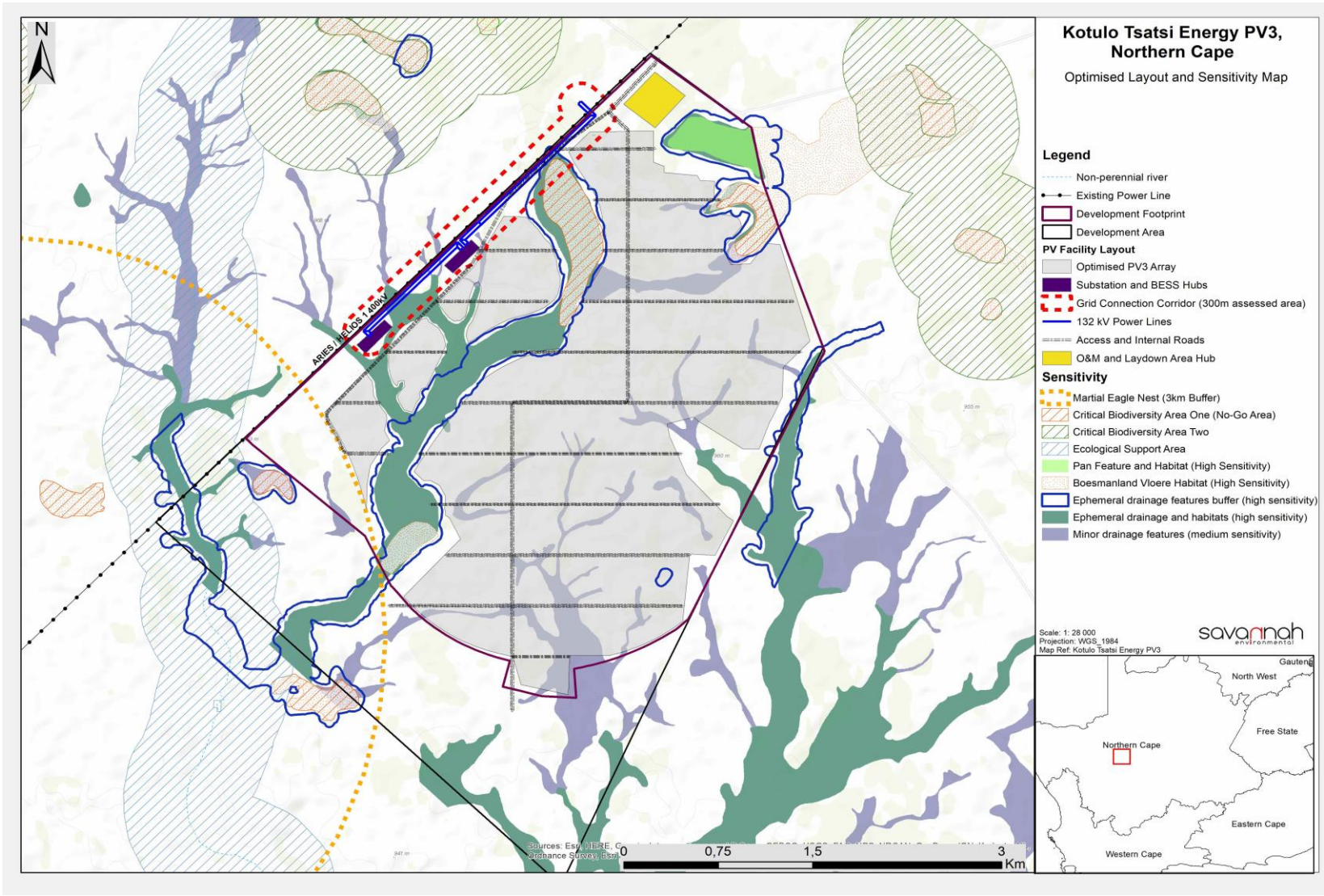

Figure 10.2: Final preferred (optimised) development footprint for Kotulo Tsatsi Energy PV3 overlain with environmental sensitivities considered to be acceptable for development (**Appendix N**)

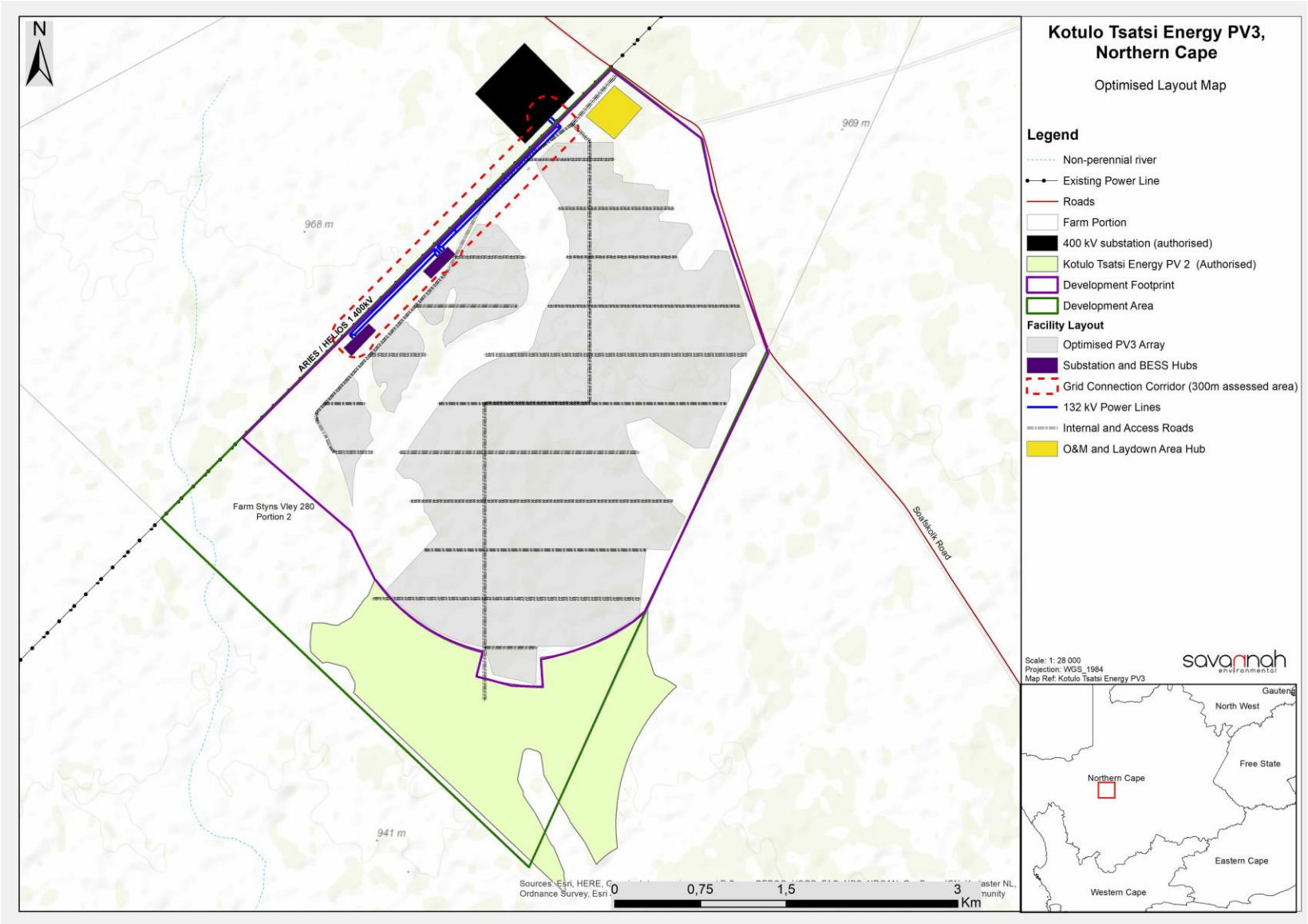

Figure 10.3: Final preferred (optimised) development footprint for Kotulo Tsatsi Energy PV3 considered to be acceptable for development (Appendix N)

10.4 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 Environmental Impact Assessment Report and the EMPr are implemented and adhered to. No fatal flaws have been identified.

These environmental costs could include:

- A loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for the PV facility. The cost of loss of biodiversity has been minimised/avoided through the implementation of recommendations provided by the specialist. All wetland features are avoided. All CBA1 areas are avoided. The resulting impact is considered to be acceptable.
- Impacts on birds. The development will result in a loss of habitat. The impact is however considered to be acceptable without any impact of high significance.
- Heritage impacts associated with the PV facility. The heritage resources are outside of the facility development footprint.
- Loss of land for agriculture. The development will remove areas available for agricultural activities. However, based on the low sensitivity of the soils within the development footprint of the PV Facility, this will not be significant.
- Visual impacts associated with the PV facility. It is envisaged that the structures where visible from shorter distances, and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence. General mitigations have been recommended to minimise the impact.
- Impacts on the social environment. Socio-economic impacts include impacts on the sense of place and property and business values that could occur during both construction and operation, the effect on social and economic infrastructure, and crime and social conflicts in the area that could be created during only the construction phase. These impacts though will only affect local communities either temporarily or over the long term. These impacts are not highly significant and can be traded off for the net positive impact created by the project in terms of production, employment, government revenue, community benefits and households' earnings.

Benefits of the Kotulo Tsatsi Energy PV3 Facility include the following:

- The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development. These will persist during the preconstruction, construction, operation and decommissioning phases of the project.
- The project provides an opportunity for a new land use on the affected properties which is considered as a more efficient use of the land and provides an opportunity for financial benefits to the current land use.
- 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.
- The water requirement for a solar facility is negligible compared to the levels of water used by coal-based technologies. This generation technology is therefore supported in dry climatic areas.
- South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. The Kotulo Tsatsi Energy PV3 Facility will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of the Kotulo Tsatsi Energy PV3 Facility are expected to occur at a national, regional, and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the PV facility.

10.5 Overall Conclusion (Impact Statement)

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using solar irradiation as the preferred technology, due to the availability of a suitable solar resource. Independent specialists appointed to undertake the assessment of potential impacts associated with the project assessed a larger area in order to inform the best location for the solar facility infrastructure. The Specialists considered desktop data, results from field work, existing literature and the National Web-based Environmental Screening Tool to inform the identification of sensitivities. A proposed layout was designed after provision of sensitivity data by the specialists with the aim of avoiding the identified sensitive areas.

Based on the specialist investigations of the larger area, a technically viable development footprint was proposed by the developer and assessed as part of the EIA process. The findings of the assessment of the development footprint undertaken by independent specialists have informed the results of this report. The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the project within the project site.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and National level. The project development area is located outside of any protected area, outside of any Critical Biodiversity Areas (CBAs) as defined in the Provincial Conservation Plan, and from the development footprint avoids any freshwater resource features. When considering biodiversity and socio-economic benefits and impacts on the affected and surrounding areas, the following is concluded from the specialist studies undertaken within this EIA process.

From a biodiversity perspective, the site is not located within a protected area. There are no specific long-term impacts likely to be associated with biodiversity or freshwater resources which cannot be reduced to a moderate or low significance. There are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding. Avifauna sensitivities were identified and avoided by the development footprint. This approach is in line with the application of the mitigation hierarchy, where all the sensitive areas which could be impacted by the development have been avoided (i.e. tier 1 of the mitigation hierarchy). Where impacts could not be avoided, appropriate mitigation has been proposed to minimise impacts. It follows therefore that the project does not adversely impact on the ecological integrity of the area.

The Social Impact Assessment has identified short-term (construction related) impact indicators and operational related socio-economic impact indicators. The assessment of the proposed facility, and its net effect from a socio-economic perspective, indicates that the project would generate greater socio-economic benefits during both the construction and operational phases than the potential losses that could occur as a result of its establishment.

As detailed in the cost-benefit analysis, the benefits of the Kotulo Tsatsi Energy PV3 Facility are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the PV facility. From an economic perspective, both positive and negative impacts are expected.

Based on the conclusions of the specialist studies undertaken, it can be concluded that the development of the Kotulo Tsatsi Energy PV3 Facility based on the current layout as provided by the Applicant will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

10.6 Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the optimised development footprint which avoids all identified highly sensitive environmental features within the development area, 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 PV3 is acceptable within the landscape and can reasonably be authorised. The optimised facility layout as provided by the Applicant (**Figure 10.3**) is considered to be appropriate from an environmental perspective, with micro-siting of panels and roads required to ensure that the layout avoids all identified sensitivities and recommended buffer areas.

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

480MW Solar PV facility: Kotulo Tsatsi Energy PV3 Facility located within farm Portion 2 of Farm Styns Vley 280, including:

» Solar PV array comprising PV modules and mounting structures.
» Inverters and transformers.
» Cabling between the project components.
» Access roads, internal distribution roads and fencing around the development area.
» Two substation and BESS hubs, including:
  - Battery Energy Storage System (BESS)
  - On-site facility substations, switching substations
» 132kV power line within a 300m wide corridor to facilitate the connection between the PV Facility and the authorised 400kV collector substation.
» O&M and laydown area hub, including:
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
  - Laydown areas and temporary construction camp area.

The following key conditions would be required to be included within an authorisation issued for Kotulo Tsatsi Energy PV3 :

» Where feasible, 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 L1** to **Appendix L3** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the Kotulo Tsatsi Energy PV3 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.
- Exclude the sensitive major ephemeral washes and their associated buffer 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.
- Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan.
- A chance find procedure 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 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.
- Maintain vegetation cover (i.e. either natural or cultivated) immediately adjacent to the actual development footprint, both during construction and operation of the proposed facility.
- Monitor all rehabilitated areas for one year following decommissioning and implement remedial actions as and when required.

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

CHAPTER 11: REFERENCES

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Nid	**Report Type**	**Author/s**	**Date**	**Title**
6035	Archaeological Specialist Reports	Jaco van der Walt	03/08/2015	Revised Archaeological Impact Assessment Report for the proposed Kotulo Tsatsi CSP 3 Facility
5801	PIA Phase 1	John Pether	23/04/2012	BRIEF PALAEONTOLOGICAL IMPACT ASSESSMENT PROPOSED ORLIGHT SA DEVELOPMENT OF A SOLAR PHOTOVOLTAIC POWER PLANT NEAR AGGENEYS, NORTHERN CAPE PROVINCE Portion 1 of Farm Aroams 57 RD
129	HIA Phase 1	Lita Webley, Dave Halkett, John Pether	01/04/2012	Heritage Impact Assessment: Proposed Kenhardt Photo-voltaic Solar Power Plant on Remainder of the Farm Klein Zwart Bast 188, Northern Cape
208	AIA Phase 1	Jonathan Kaplan	01/11/2012	Archaeological Impact Assessment for the proposed Green Continent Partners 75 MW Photovoltaiv Electricity Generation Facility on Portion 8 of the Farm Olyvenkolk No. 187, Kenhardt, Northern Cape
209	AIA Phase 1	Jonathan Kaplan	01/11/2012	AIA: PROPOSED WINE ESTATE CAPITAL MANAGEMENT 75MW PHOTOVOLTAIC ELECTRICITY GENERATION FACILITY ON PORTION 12 OF THE FARM OLYVENKOLK NO. 187, KENHARDT
4274	AIA Phase 1	David Morris	01/04/2004	Archaeological Resources at Geel Vloer, Bushmanland: A Phase 1 Archaeological Impact Assessment
340296	Palaeontological Specialist Report	John Almond	02/03/2015	Palaeontological Heritage Assessment: Combined Desktop and Field Based Study for the Proposed SolarReserve Kotulo Tsatsi Energy CSP and PV Solar Energy Facilities near Kenhardt, NC Province
397221	Heritage Impact Assessment Specialist Report	Jaco van der Walt	31/03/2017	HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED SOLARRESERVE KOTULO TSATSI PHOTOVOLTAIC POWER PLANT 2
169885	Archaeological Specialist Reports	Jaco van der Walt	12/05/2014	Archaeological Scoping Report for the Proposed Kotulo Tsatsi Energy Solar Park including Concentrated Solar Power (Tower & Through Technologies) and Photovoltaic (PV) Solar Facilities, Northern Cape
257586	Archaeological Specialist Reports	Jaco van der Walt	05/02/2015	Archaeological Impact Assessment for the Proposed Kotulo Tsatsi CSP 3 Facility, located close to Kenhardt in the Northern Cape

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