

McTaggarts PV3

Northern Cape Province

Final Basic Assessment Report

DEA Ref No.: 14/12/16/3/3/1/2113

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PROJECT DETAILS

DEA Reference No	:	<u>14/12/16/3/3/1/2113</u>
Title	:	<u>Final</u> Basic Assessment Process: Basic Assessment Report for McTaggarts PV3, a solar PV facility and associated infrastructure proposed on a site near Upington and within the Upington Renewable Energy Development Zone (REDZ), in the Northern Cape Province.
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When used as a reference this report should be cited as: Savannah Environmental (2020) Basic Assessment for McTaggarts PV3 and Associated Infrastructure, Northern Cape Province.

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PURPOSE OF THE BA REPORT AND INVITATION TO COMMENT

McTaggarts PV3 (Pty) Ltd, a Special Purpose Vehicle (SPV), the proponent, proposes the development of a 75MW solar photovoltaic (PV) facility, as well as, associated infrastructure on a broader study area and development area located near the town of Upington in the Northern Cape Province. The solar PV facility will be known as McTaggarts PV3. The broader study area falls within the jurisdiction of the Kai !Garib Local Municipality and the greater ZF Mgcawu District Municipality, as well as, the Upington Renewable Energy Development Zone (REDZ). The broader study area borders the Dawid Kruiper Local Municipality to the east.

The project development footprint is within the development area that will house the proposed development, and which has been considered fully within this Basic Assessment (BA) process and assessed in terms of its suitability from an environmental and social perspective within this Basic Assessment (BA) Report.

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 development of McTaggarts PV3 requires Environmental Authorisation (EA) from the National Department of Environmental Affairs (DEA) subject to the completion of a Basic Assessment process, as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326) and as per GNR 114. The need for EA, subject to the completion of a Basic Assessment process, is triggered by the inclusion of, amongst others, Activity 1 of Listing Notice 2 (GNR 325) as well as the location of the project site within the Upington REDZ.

The BA Report was made available for a 30-day review period from **13 November 2019 to 13 December 2019** at the following locations:

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

The Final BA Report includes all comments received, as well as responses to those comments (refer to **Appendix C8**) and where applicable, this Final BA Report has been amended to address these comments. All amendments/changes and/or additions made to this Final BA Report have been underline for ease of reference.

EXECUTIVE SUMMARY

McTaggarts PV3 (Pty) Ltd, a Special Purpose Vehicle (SPV) proposes the development of McTaggarts PV3, a photovoltaic (PV) solar energy facility, as well as, associated infrastructure on a site located 24km south-west of the town of Upington in the Northern Cape Province. A broader study area has been identified for the development of McTaggarts PV3 which consists of two affected properties including Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452. The broader study area falls within the Kai !Garib Local Municipality and the greater ZF Mgcawu District Municipality. The broader study area also borders the Dawid Kruiper Local Municipality to the east. Refer to **Figure 1**.

A development area of 260ha has been identified within the broader study area by the proponent for the development of McTaggarts PV3 and associated infrastructure, which has been fully considered within this BA process and assessed in terms of its suitability from an environmental and social perspective within this BA Report.

The development area is regarded as being of a sufficient extent to provide opportunity for the avoidance of major environmental sensitivities. McTaggarts PV3 will have a contracted capacity of up to 75MW and will include specific infrastructure, namely:

- » Fixed-tilt or tracking solar PV panels with a maximum height of 3.5m;
- » Centralised inverter stations or string inverters;
- » A temporary laydown area;
- » Cabling between the panels, to be laid underground where practical;
- » A 22kV or 33kV/132kV on-site substation of up to 1ha in extent to facilitate the connection between the solar PV facility and the electricity grid;
- » An access road to the development area with a maximum width of 6m;
- » Internal access roads within the PV panel array area with a maximum width of 5m; and
- » Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses, a workshop and visitors centre.

McTaggarts PV3 (Pty) Ltd has confirmed that the development area is suitable for the development of a solar energy facility from a technical perspective due to the available solar resource, access to the electricity grid, current land use, land availability, site-specific characteristics such as topography and accessibility, the location within the Upington REDZ, as well as the proximity of the area to authorised and constructed solar energy facilities, i.e. the operational Khi Solar One CSP facility; and the Sirius Solar PV One project and the Dyasons Klip 1 and Dyasons Klip 2 PV projects, which are currently under construction.

No environmental fatal flaws were identified in the detailed specialist studies conducted, and no impacts of unacceptable significance are expected to occur with the implementation of the recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features and the undertaking of monitoring, as specified by the specialists. Some mitigation measures have already been considered and implemented through the micro-siting of the solar PV facility development footprint, such as the avoidance of the drainage line and poorly developed drainage lines located within the development area of McTaggarts PV3, as well as the placement of the development area outside and to the east of the drainage line which bisects Portion 3 of the Farm McTaggarts Camp 453.

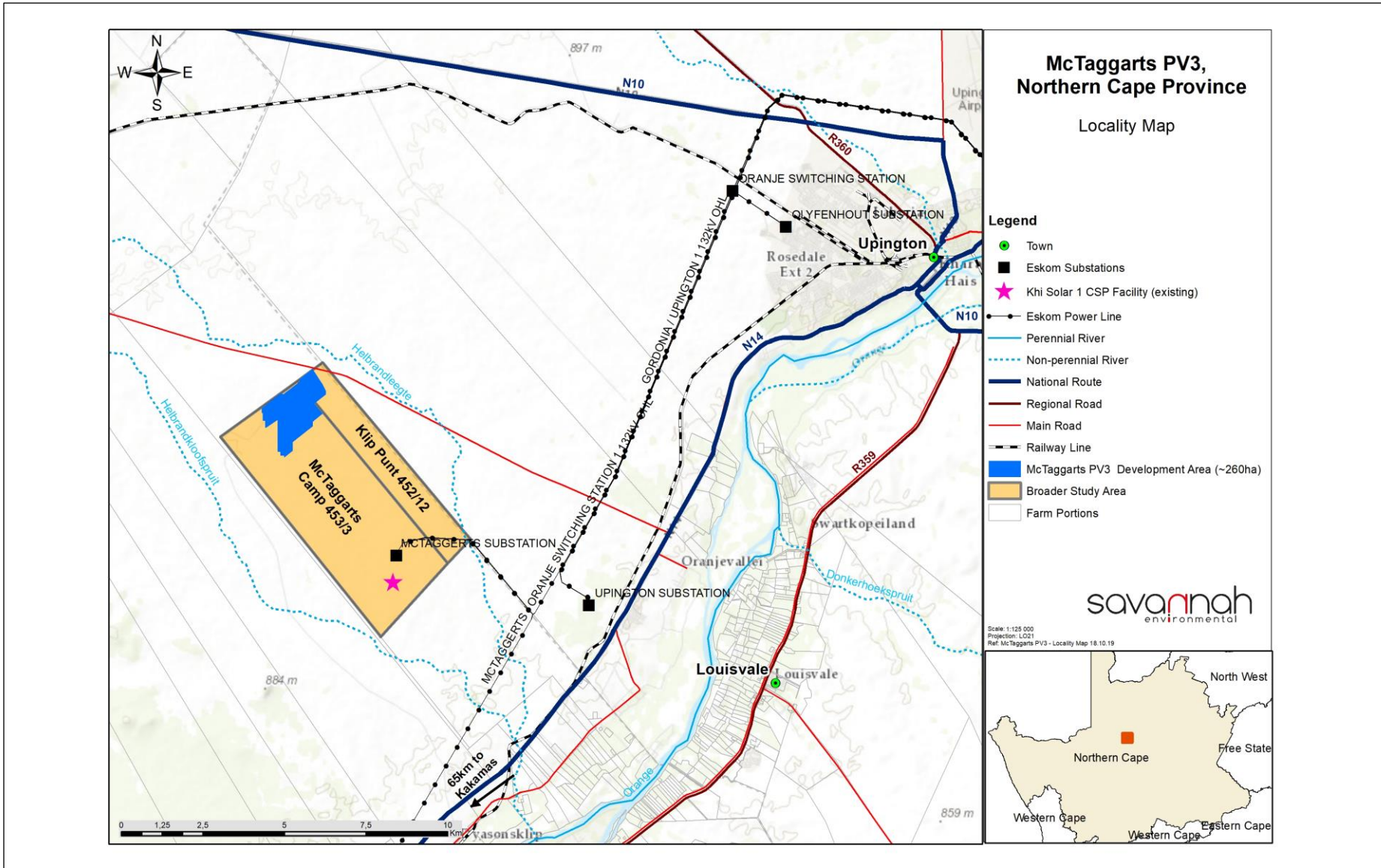


Figure 1: Locality map illustrating the location of the broader study area and development area under investigation for the development of McTaggarts PV3

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

- » Impacts on ecology, flora and fauna.
- » Impacts on avifauna.
- » Impacts on aquatic resources.
- » Impacts to soils, land types and agricultural potential.
- » Impacts on heritage resources, including archaeology and palaeontology.
- » Visual impacts on the landscape as a result of the facility.
- » Positive and negative social impacts.
- » Traffic impacts.

Impacts on Ecology

The Ecological Impact Assessment (**Appendix D**) assessed the impact of McTaggarts PV3 on the sensitive ecological features present within the development area for the life-cycle of the development. The assessment identified impacts within the construction, operation and decommissioning phases of the project.

During the construction phase (and the decommissioning phase), the impacts include impacts on vegetation and listed or protected plant species and direct faunal impacts. The duration of the impacts range from long-term to short-term, with the magnitude of the impacts ranging from medium to low. The significance of the construction phase impacts is medium or low (depending on the impact being considered) and with the implementation of the mitigation measures recommended by the specialist. No impacts of high significance were identified from an ecological perspective.

During the operation phase, the anticipated impacts include habitat degradation due to erosion and alien plant invasion and faunal impacts due to the operation of the facility. The duration of the impacts will be long-term, with the magnitude of the impacts ranging from medium to minor. The significance of these impacts for the operation phase will be low, with the implementation of the recommended mitigation measures. No impacts of a high significance were identified.

From the findings of the Ecological Impact Assessment it can be concluded that no impacts of high ecological significance or fatal flaws were identified which would hinder the development of McTaggarts PV3. The development area is considered suitable for the establishment of McTaggarts PV3 and all impacts associated with the development can be mitigated to an acceptable level of either low or medium significance (depending on the impact under consideration). Therefore, the proposed development and the predicted ecological impact is considered to be appropriate and acceptable from an ecological perspective and will not result in detrimental impacts to ecosystems and habitat features within the development area and within the adjacent properties. As a result, the specialist has indicated that the development may be authorised, constructed and operated subject to the implementation of the recommended mitigation measures.

Considering the development footprint assessed for McTaggarts PV3, the specialist has indicated that the project can be supported from a terrestrial ecology point of view.

Impacts on Avifauna

The Avifauna Impact Assessment (**Appendix E**) is based on the findings of two field surveys undertaken in spring (4 – 8 October 2018) and again in late summer (9 -12 April 2019). The avifauna impact identified to be associated with the construction phase (including decommissioning) will be negative with a short-term duration and will have a magnitude ranging from moderate to low. For the operation phase, the impact will also be negative, with a long-term duration for the life of the facility and a magnitude of moderate to low.

During the construction phase (and decommissioning phase) of McTaggarts PV3, direct avifauna impacts include habitat loss and disturbance related to vegetation clearance and the displacement of shy avifauna species as a result of noise and an increased human presence associated with construction-related activities. The significance of the construction phase impact will be medium, with the implementation of mitigation measures. No impacts of a high significance from the construction phase are expected to occur.

It must be noted that the northern section of the development area overlaps with gravel plains located which has been noted to be used by red-listed avifaunal species, including the Karoo Korhaan and Kori Bustard. This habitat will be lost where panels as part of McTaggarts PV3 are installed, however the loss of habitat will be less than 1% of just this habitat tract and is therefore considered of low significance.

Impacts on avifauna during the operation phase of McTaggarts PV3 include collisions with PV panels, entrapment along perimeter fencing, disturbance and night lighting. The significance of the impacts will be low, with the implementation of mitigation measures. No impacts of a high significance are expected to occur during the operation phase.

From the results of the Avifauna Impact Assessment, it can be concluded that the development area for McTaggarts PV3 is considered to represent a broadly suitable environment for the location of a solar PV facility. Taking into consideration that the development area supports a typical bioregional avifaunal assemblage, and that there are no known communal breeding or roosting sites of red-listed species, there are no impacts associated with the development that are regarded to be of a high residual significance and which cannot be mitigated to a low significance. Therefore, the development of McTaggarts PV3 is considered to be acceptable and supported from an avifaunal perspective.

From the results of the Avifauna Impact Assessment, it is concluded that no fatal flaws will be associated with the development of McTaggarts PV3. The specialist has indicated that the project can be authorised subject to the implementation of the recommended mitigation measures.

Impacts on Aquatic Resources

The Aquatic Resources Impact Assessment (**Appendix F**) assessed the impact of McTaggarts PV3 on aquatic resources and/or features present within the broader study area and development area for the life-cycle of the project.

During the construction and operation phase, impacts expected with the development of McTaggarts PV3 include a loss of riparian systems associated with the mainstem rivers Helbrandleegte and Helbrandkloofspruit where these systems are directly infringed on; loss of wetlands; impact on poorly

developed drainage lines; impact on riparian and wetland systems through increase in surface water runoff; increase in sedimentation and erosion and water quality impacts. The impacts will be negative with mainly a long-term duration and high to low magnitude (depending on the impact being considered). From the findings of the Aquatic Resources Impact Assessment, it is concluded that the proposed layout for McTaggarts PV3 would have no direct impact on the mainstem rivers (well-developed drainage lines including Helbrandleegte and Helbrandkloofspruit) and the aquatic environment for the most part, as the layout avoids the significant high sensitivity watercourses. The only exception are poorly developed drainage lines of a high sensitivity are present within the central southern and north eastern corner of the development area and development footprint where PV panels will span these features.

The proposed position of the on-site facility substation within the development area is within the buffer area of a poorly developed drainage (not the feature itself) line considered to be of a high sensitivity. It is recommended by the specialist that the on-site facility substation be located outside of the drainage feature to reduce the risk of habitat loss and water quality related issues should any water flow occur during the life of the facility (i.e. as a substation unit stores oils which could directly impact the aquatic feature).

A small pan identified as being of a high sensitivity is located in the western portion of the development footprint, however due to the size and the functionality of the pan, the pan is not considered to be significant. The loss of this aquatic feature to the development of McTaggarts PV3 is therefore considered to be acceptable.

Road crossings, associated with the assessed development area and development footprint, are located in the smaller drainage areas, however with suitable mitigation (proper stormwater management and post construction rehabilitation) the impact would be of a low significance. This rating of low significance is also based on the consideration that the PV panels will span these features where feasible and that the mounting structure will be located outside of the delineated systems/features.

Based on the findings of the Aquatic Resources Impact Assessment there is no objection to the authorisation of the proposed activities, subject to the implementation of the specialist recommendations and mitigation measures. It is recommended by the specialist that a detailed walkdown is conducted by an aquatic specialist of the final development footprint prior to the commencement of the construction phase to ensure that the PV panel mounting structures are located in areas of suitable sensitivity from an aquatic perspective in order to minimise damage of vegetation (and to focus disturbance in areas already transformed and disturbed); and to confirm the position of the on-site substation located within an area considered to be acceptable from an aquatic perspective (i.e. avoidance of the buffer area associated with the aquatic resource).

Therefore, significance of the remaining impacts assessed for the aquatic systems after mitigation would be low. This includes the internal roads proposed that would need to cross some of these aquatic systems. This is also based on the consideration that in some areas, the PV panels will span these aquatic resources (i.e. features) however the footings/mounting structures will be located outside of the identified features.

The construction and operation of McTaggarts PV3 and the associated infrastructure is supported from an aquatic resources perspective and is considered acceptable subject to the proponent obtaining the necessary water use authorisation from the Department of Water and Sanitation and the implementation of the recommended mitigation measures from the specialist.

Impacts on Soil and Agricultural Potential

The Soils, Land Use and Agricultural Impact Assessment (**Appendix G**) has identified and assessed impacts associated with the development of McTaggarts PV3. These impacts are expected during the construction and operation phases and include, soil erosion, chemical pollution and an impact on the current land capability of the development area. These impacts will be negative with a permanent to short-term duration (depending on the impact being considered) and will have a magnitude of moderate to low. The significance of the impacts is medium or low (depending on the impact being considered) and following the implementation of the recommended mitigation measures.

No fatal flaws have been identified from a soils and agricultural perspective; therefore, all impacts can be mitigated to be within an acceptable level of impact during life cycle of the project. Therefore, the development of McTaggarts PV3 is considered to be acceptable from a soils and agricultural perspective.

The specialist has indicated that the development of McTaggarts PV3 can be authorised and that the development footprint proposed and assessed as part of this BA Report is acceptable from a soils and agricultural potential perspective. This is subject to the implementation of the recommended mitigation measures as provided by the specialist.

Impacts on Heritage (including archaeology and palaeontology)

The Heritage Impact Assessment (**Appendix H**) assessed the impact of McTaggarts PV3 on archaeological and palaeontological resources within the broader study area and the development area. It is expected that impacts to heritage will occur during the construction phase due to the on-ground disturbance required by the construction activities.

No significant archaeological resources were identified within the footprint of McTaggarts PV3. The Stone Age occurrences identified consist of isolated find and low-density ex-situ surface scatters containing Middle Stone Age Material with a few incidences of Early and Later Stone Age lithics. The identified archaeological material is of a low significance due to, archaeological samples of a small size and void of context offering little scientific value. Therefore, these Stone Age finds are regarded as not being worthy of any conservation; therefore, these sites have been sufficiently recorded and no further action will be required. The significance of the impact on archaeological resources is therefore low. The duration of the impact will be permanent should the impact occur and will have a low magnitude.

Construction-related activities are unlikely to have an impact on the fossil heritage if preserved within the development area, however, for McTaggarts PV3, the geological structures of the area suggest the rocks are either of an igneous origin and too old to contain any fossil heritage. Therefore, based on the experience of the specialist and the lack of any previously recorded fossils from the broader study area, it is unlikely that any fossil heritage will be preserved and therefore the impact is considered to be of a low significance. The duration of the impact will be permanent should the impact occur and will have a low magnitude.

Based on the nature of the archaeological resources identified and the lack of any fossils recorded or expected in the area, the significance of the heritage impacts will be low. Therefore, the proposed

development and the impact to heritage resources is considered to be appropriate and acceptable from a heritage perspective and will not result in detrimental impacts.

Visual Impacts

The Visual Impact Assessment (**Appendix I**) identified negative and neutral impacts on visual receptors during the construction and the operation phases of McTaggart PV3. The impacts includes a change in the character and sense of place of the landscape setting, a change in the character of the landscape as seen from the N14 national road, the R359 and the Lutzputs Road, a change in the landscape as seen from local homesteads and settlement areas, glare impacts which could affect travellers on the Lutzputs Road and the flight path of the Upington International Airport, and visual impacts related to the operational, safety and security lighting of the solar PV facility on observers.

The duration of the impacts is expected to be long-term for majority of the visual impacts and with a magnitude ranging from low to small. The significance of the impacts will be low or medium (depending on the impact being considered) with the implementation of mitigation. No impacts of a high significance are expected to occur and it can be concluded that the development of McTaggart PV3 will be viewed in the context of the Khi Solar One CSP facility and the Sirius Solar PV One project which is currently under construction. The development of McTaggart PV3 is therefore considered to be acceptable from a visual perspective.

Social Impacts

The Social Impact Assessment (**Appendix J**) identified that most social impacts associated with the development of McTaggart PV3 will have a short-term duration associated with the construction phase and long-term duration during the operation phase of the project. The magnitude of the impacts ranges from high to small (depending on the impact being considered) and the status thereof. Both positive and negative impacts have been identified for both the construction and operation phases of the development.

During the construction phase, negative impacts include, nuisance impacts (including noise and dust), an influx of construction workers and job seekers to the area and a change in population, safety and security impacts, impacts on daily living and movement patterns, visual and a sense of place impacts. The significance of the negative construction phase impacts will be low with the implementation of the recommended mitigation measures. The positive social impacts associated with the construction phase of McTaggart PV3 include, an economic multiplier effect; and direct and indirect employment and skills development opportunities. The significance of the positive impacts will be medium with the implementation of the recommended enhancement measures by the specialist.

Impacts associated with the operation of McTaggart PV3 will be both positive and negative. The negative impacts are related to the change in the sense of place associated with the operation of the solar PV facility. The significance of the negative impacts will be low with the implementation of the recommended mitigation measures. The positive impacts associated with the operation of the facility relate to the development of non-polluting renewable energy infrastructure, a contribution to Local Economic Development (LED) and social upliftment, and the creation of employment and skill development opportunities for the local economy and the country. The significance of the positive impacts will be low and medium with the implementation of the recommended enhancement measures.

McTaggarts PV3 is unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that McTaggarts PV3 can be authorised from a social perspective.

Impacts on Traffic

Traffic impacts are expected with the development of McTaggarts PV3 which were identified and assessed as part of a Traffic Impact Assessment (**Appendix K**).

During the construction phase, traffic, noise and dust will be generated through the transportation of project components and employees to the development area. The duration of the impacts will be of a very short-term and will have a low to minor magnitude. The significance of the construction phase impacts on traffic will be low, with the implementation of the mitigation measures recommended by the specialist.

The traffic generated during the operation phase of McTaggarts PV3 will be minimal and of no significance to the existing road network. Therefore, the impacts of traffic for this phase are not considered further.

Furthermore, no fatal flaws and impacts of a high significance are expected and therefore the development of McTaggarts PV3 is considered to be acceptable from a traffic perspective.

Assessment of Cumulative Impacts

The McTaggarts PV3 facility is located within the Upington Renewable Energy Development Zone (REDZ), or REDZ 7. The REDZ areas are zones identified by the DEA as a geographical area of strategic importance for the development of large-scale solar photovoltaic and wind energy development activities. Therefore, the REDZ areas are considered as nodes for the development of renewable energy developments. At present one operational CSP facility and three (3) PV solar energy facilities under construction are located within the vicinity of the development area for McTaggarts PV3. These include the operational Khi Solar One CSP facility, and the Dyasons Klip 1 PV Project, Dyasons Klip 2 PV project, and the Sirius Solar PV One project which are currently under construction.

No unacceptable cumulative impacts have been identified.

Figure 2 provides an environmental sensitivity map of the preferred layout for McTaggarts PV3.

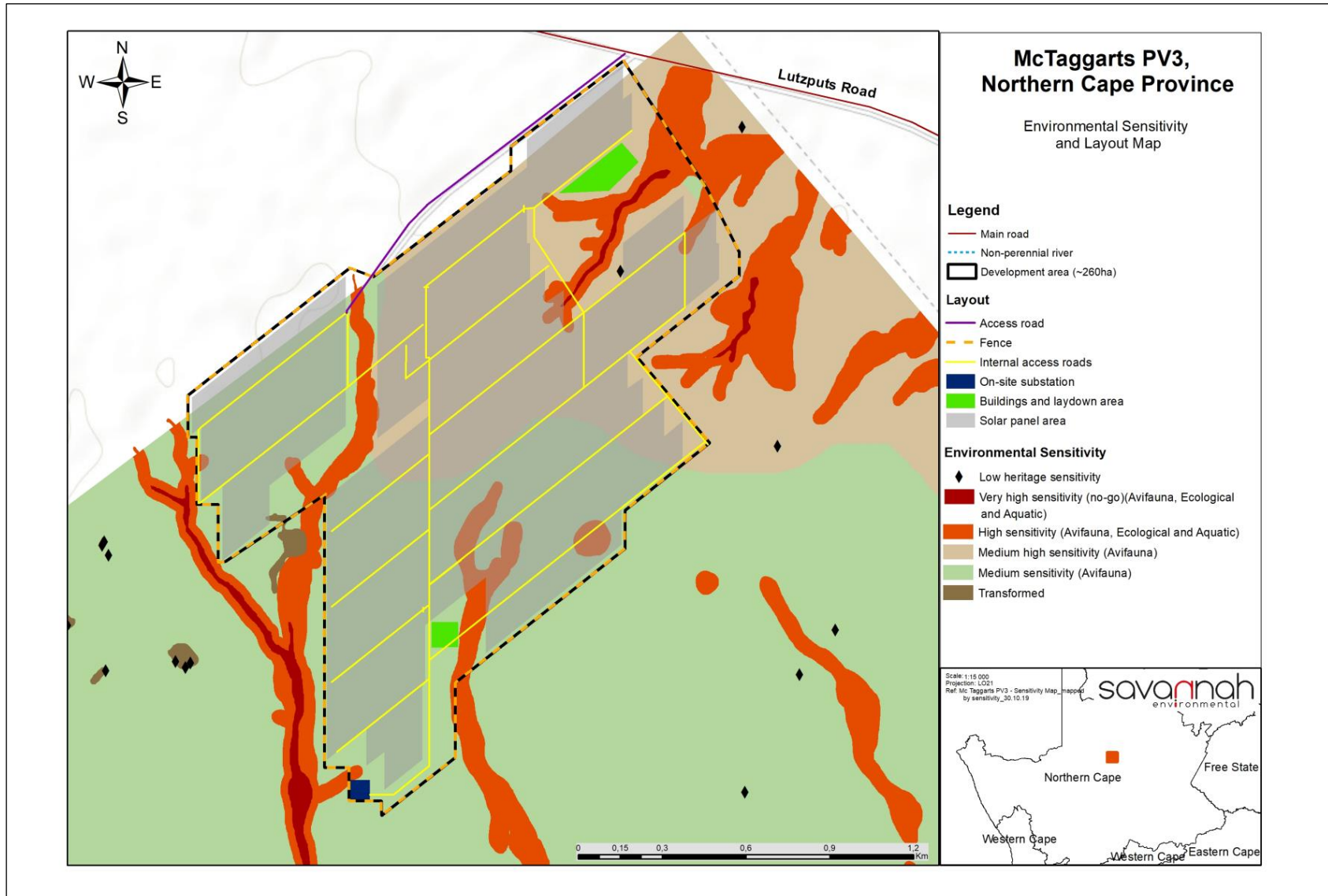


Figure 2: Final preferred layout map of the preferred development footprint for McTaggarts PV3, as was assessed as part of the BA process, overlain with the environmental sensitivities (refer to **Appendix O** for A3 maps)

DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Environmental 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 (EMPr): A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a project or facility and its ongoing maintenance after implementation.

Environmental Officer (EO): The Environmental Officer (EO), employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. The EO must act as liaison and advisor on all environmental and related issues

and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

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

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

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

Incident: An unplanned occurrence that has caused, or has the potential to cause, environmental damage.

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 by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance

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.

Photovoltaic effect: Electricity can be generated using photovoltaic solar panels which are comprised of individual photovoltaic cells that absorb solar energy to directly produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

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

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

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

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

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

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

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

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

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

- (i) a by-product is not considered waste; and
- (ii) any portion of waste once re-used, recycled and recovered, ceases to be waste.

ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
DAFF	Department of Agriculture, Forestry and Fisheries
dB	Decibels
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DENC	Northern Cape Department of Environment and Nature Conservation
DoE	Department of Energy
DMRE	Department of Mineral Resources and Energy
EAP	Environmental Impact Practitioner
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
GPS	Global Positioning System
GWh	Giga Watt hour
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
MW	Mega Watt
NEMA	National Environmental Management Act
NEMAA	National Environmental Management Amendment Act
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NWA	National Water Act
PM	Post Meridiem; "Afternoon"
SAHRA	South African National Heritage Resources Agency
SWMP	Stormwater Management Plan

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CHAPTER 1: INTRODUCTION

McTaggarts PV3 (Pty) Ltd, a Special Purpose Vehicle (SPV) proposes the development of McTaggarts PV3, a photovoltaic (PV) solar energy facility, as well as, associated infrastructure on a site located 24km south-west of the town of Upington in the Northern Cape Province (refer to **Figure 1.1**). The site falls within the jurisdiction of the Kai !Garib Local Municipality¹ and the greater ZF Mgcawu District Municipality. The project will be known as **McTaggarts PV3** and will be one of four solar PV facilities which are collectively known as the **Khunab Solar Development**. A broader study area consisting of Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452 is being considered for McTaggarts PV3. A development area² of 260ha has been identified within the broader study area for the development of McTaggarts PV3 and associated infrastructure, which is assessed within this Basic Assessment (BA) Report.

An existing renewable energy facility known as Khi Solar One is located to the south of the development area identified for McTaggarts PV3 within the broader study area. The broader study area as well as the development area are accessible via the existing Lutzputs gravel road which runs along the north and north-eastern boundary of the broader study area. From a regional perspective, the greater Upington area is considered favourable for the development of commercial solar energy facilities by virtue of the prevailing climatic conditions (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 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. The broader study area is also located within the Renewable Energy Development Zone (REDZ) 7, otherwise known as the Upington REDZ.

The REDZ are zones identified by the Department of Environmental Affairs³ (DEA) as geographical areas of strategic importance for the development of large-scale solar PV and wind energy development activities and which have been earmarked for the development of renewable energy facilities within South Africa as per GN R114 of February 2018.

McTaggarts PV3 is planned to be bid into the Department of Energy's⁴ 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 McTaggarts PV3 set to inject 75MW into the national grid. In order to connect McTaggarts PV3 to the national grid, a grid connection solution will need to be developed and implemented, which is the subject of a separate BA process.

¹ The Dawid Kruiper Local Municipality is located to the east of the broader study identified for the development of McTaggarts PV3.

² The development area is the identified area within Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452 within which the required infrastructure for the McTaggarts PV3 solar facility will be sited. The facility layout of the infrastructure and the area to be covered by the infrastructure is known as the development footprint.

³ The Department of Environmental Affairs (DEA) is soon to become the Department of Environment, Forestry and Fisheries (DEFF).

⁴ The Department of Energy (DoE) is soon to become the Department of Mineral Resources and Energy (DMRE).

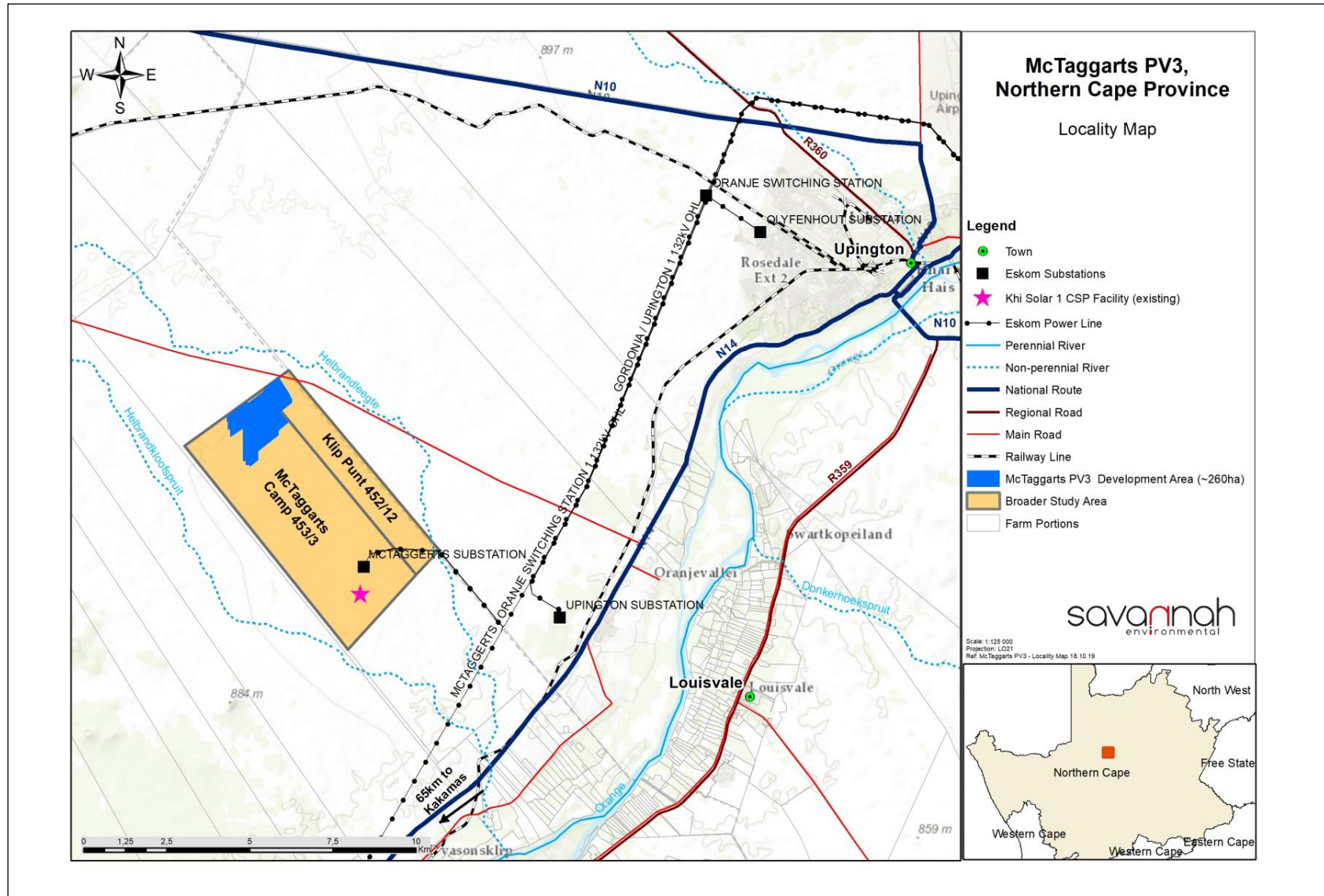


Figure 1.1: A locality map illustrating the McTaggarts PV3 development area within the broader study area

1.1 Project Overview

As a precursor to initiating the BA process, McTaggarts PV3 (Pty) Ltd completed a site selection matrix to identify the development area for the establishment of McTaggarts PV3.

Table 1.1: A detailed description of the McTaggarts PV3 development area

Province	Northern Cape Province
District Municipality	ZF Mgcawu District Municipality
Local Municipality	Kai !Garib Local Municipality Dawid Kruiper Local Municipality
Ward number(s)	8 of Kai !Garib Local Municipality
Nearest town(s)	Upington (24km) and Keimoes (23km)
Broader study area	Portion 3 of the Farm McTaggarts Camp 453 Portion 12 of the Farm Klip Punt 452
Affected property of the development area: Farm name(s), number(s) and portion numbers	Portion 3 of the Farm McTaggarts Camp 453 Portion 12 of the Farm Klip Punt 452
SG 21 Digit Code (s)	C02800000000045300003 C02800000000045300012
Current zoning of the study area	Agricultural
Site Co-ordinates (centre of the development area)	28°29'45.42"S 21° 2'48.25"E Corner points of the development area are included in Appendix O .

McTaggarts PV3 will have a contracted capacity of up to 75MW. The solar PV facility will also include specific infrastructure, namely:

- » Fixed-tilt or tracking solar PV panels with a maximum height of 3.5m;
- » Centralised inverter stations or string inverters;
- » A temporary laydown area;
- » Cabling between the panels, to be laid underground where practical;
- » A 22kV or 33kV/132kV on-site substation of up to 1ha in extent to facilitate the connection between the solar PV facility and the electricity grid;
- » An access road to the development area with a maximum width of 6m;
- » Internal access roads within the PV panel array area with a maximum width of 5m; and
- » Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses, a workshop and visitors centre.

The key infrastructure components associated with the development of McTaggarts PV3 are described in greater detail within Chapter 2 of this BA Report.

1.2 Requirement for a Basic Assessment Process

The National Environmental Management Act (NEMA, Act No. 107 of 1998) is the national legislation that provides for the authorisation of certain controlled activities known as 'listed activities'. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be

considered, investigated, assessed, and reported on to the competent authority (the decision-maker) charged by the NEMA with the granting of the relevant environmental authorisation being applied for through this BA process.

The development (i.e. construction and operation) of McTaggarts PV3 is subject to the requirements of the EIA Regulations of 2014 (as amended), published in terms of Section 24(5) of NEMA. Therefore, in terms of the EIA Regulations of 2014, promulgated under Section 24 and 24D of NEMA, various aspects of McTaggarts PV3 are listed as activities that may have a detrimental impact on the environment. The primary listed activity triggered by McTaggarts PV3 is Activity 1 of Listing Notice 2 (GN R325) which relates to the development of facilities or infrastructure for the generation of electricity from a renewable resource where the generating capacity is 20MW or more. McTaggarts PV3 will have a contracted capacity of 75MW.

The need to comply with the requirements of the EIA Regulations ensures that the decision-makers are provided with an opportunity to consider the potential environmental impacts of a project early in the development process and assess whether the environmental impacts can be avoided, minimised, or mitigated to acceptable levels. The nature and extent of McTaggarts PV3, as well as, the potential environmental impacts and mitigation measures associated with the construction, operation and decommissioning has been assessed through detailed specialist assessments. This process provides an opportunity to test the environmental suitability of the development area, to delineate areas of sensitivity within the development area, and to define the facility layout of the components of McTaggarts PV3. Therefore, site-specific specialist assessments of the broader study area and specifically the identified development area have been undertaken during the BA process.

The McTaggarts PV3 facility is located within the Upington REDZ, one of the eight (8) designated REDZ areas. The process to be followed in applying for environmental authorisation for a large-scale PV project in a REDZ area was formally gazetted on 16 February 2018, in GN R114. As the proposed development is located within the Upington REDZ, McTaggarts PV3 is now subject to a BA process and not a full Scoping and Environmental Impact Reporting (SEIR) process, as well as a shortened timeframe of 57 days for the processing of an application for environmental authorisation.

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

This BA Report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (as amended) promulgated in terms of Chapter 5 of the National Environmental Management Act (No. 107 of 1998). This Chapter of the BA Report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
1 (a) the details of the EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details and expertise of the EAP who prepared the report is included in section 1.4 and CVs of the project team are included in 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 co-ordinates of the boundary of	A description of the location of McTaggarts PV3 is included in Table 1.1 and Figure 1.1 . The information provided includes the 21-digit Surveyor General Code of the affected property and the farm name. Information on the relevant province, local and district

the property or properties.

municipalities, ward and current land zoning is also provided.

The BA Report is structured according to the following chapters:

- » **Chapter 1** provides background to McTaggart PV3 and the BA process.
- » **Chapter 2** provides a description of McTaggart PV3.
- » **Chapter 3** provides site selection information and identified project alternatives.
- » **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa and specifically for McTaggart PV3.
- » **Chapter 5** describes the need and desirability of McTaggart PV3 within the surrounding Upington area.
- » **Chapter 6** outlines the approach to undertaking the BA process.
- » **Chapter 7** describes the existing biophysical and social environment within and surrounding the broader study and development area.
- » **Chapter 8** provides an assessment of the potential issues and impacts associated with the solar PV facility and presents recommendations for the mitigation of significant impacts.
- » **Chapter 9** provides an assessment of the potential cumulative impacts.
- » **Chapter 10** presents the conclusions and recommendations based on the findings of the BA Report.
- » **Chapter 11** provides references used in the compilation of the BA Report.

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

In accordance with Regulation 12 of the 2014 EIA Regulations (GN R326), McTaggart PV3 (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd (Savannah Environmental) as the independent environmental consultant to undertake the Basic Assessment and prepare the BA Report for McTaggart PV3. Neither Savannah Environmental nor any of its specialists are subsidiaries of/or are affiliated to McTaggart PV3 (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed solar PV facility.

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. The company was established in 2006 with a clear objective to provide services to the infrastructure development sector. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

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

The Savannah Environmental team includes:

- » **Reuben Maroga** - the principle author of this report. He holds a Bachelor degree in Environmental Management and an Honours degree in Geology and has two years of experience in the environmental management field. His key focus is on undertaking environmental impact assessments, public participation, environmental management plans and programmes.
- » **Lisa Opperman** - the co-author of this report. She holds a Bachelor degree with Honours in Environmental Management and has four years of experience in the environmental field. Her key focus is on environmental impact assessments, public participation, environmental management plans and programmes, as well as mapping using ArcGIS for a variety of environmental projects.
- » **Jo-Anne Thomas** – is the registered EAP for this project. Jo-Anne holds a Master of Science Degree in Botany (M.S.c Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP). She has over 20 years of experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. During this time, she has managed and coordinated a multitude of large-scale infrastructure EIAs and is also well versed in the management and leadership of teams of specialist consultants, and dynamic stakeholders. Jo-Anne has been responsible for providing technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, EIA studies, environmental permitting, public participation, EMPs and EMPs, environmental policy, strategy and guideline formulation, and integrated environmental management (IEM). Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation.
- » **Nicolene Venter** – a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

Curricula Vitae (CVs) detailing Savannah Environmental team's expertise and relevant experience are provided in **Appendix A**.

1.5 Screening Tool Specialist Assessments

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of 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); therefore, **Table 1.2** provides a summary of the specialists assessments identified in terms of the screening tool and responses to each assessment from the project team:

Table 1.2: Specialist assessments identifies in terms of the national web based environmental screening tool

Specialist Assessment	Project Team Response
Landscape/Visual Impact Assessment	A Visual Impact Assessment has been undertaken for McTaggarts PV3 and is included in this BA Report as Appendix I .
Archaeological and Cultural Heritage Impact Assessment	The BA Report includes a Heritage Impact Assessment (including archaeology and palaeontology) which is included in this BA Report as Appendix H .
Palaeontology Impact Assessment	The Heritage Impact Assessment (Appendix H) includes an assessment of McTaggarts PV3 on palaeontological resources within the development area.
Terrestrial Biodiversity Impact Assessment	An Ecological Impact Assessment (included as Appendix D) includes the impact of McTaggarts PV3 on the biophysical (i.e. flora and fauna) environment identified within the proposed development area for the project.
Aquatic Biodiversity Impact Assessment	Aquatic biodiversity present within the development area for McTaggarts PV3 has been included in the Ecological Impact Assessment (Appendix D).
Hydrology Impact Assessment	Freshwater Impact Assessment (i.e. aquatic) (included as Appendix F) includes the impact of McTaggarts PV3 on the hydrological features within the identified development area.
Socio-Economic Assessment	A Social Impact Assessment (Appendix J) has assessed the impact of McTaggarts PV3 on the social environment within the vicinity of the broader study area for the proposed development.
Plant Species Assessment	The Ecological Impact Assessment (Appendix D) has assessed the impacts of the proposed development on plant and animal species identified within the development area for McTaggarts PV3.
Animal Species Assessment	

1.6 Details of the Independent Specialist Team

In order to adequately identify and assess potential impacts associated with the project, a number of specialists have been appointed as part of the project team and have provided specialist input into this BA Report (refer to **Table 1.3**). CVs detailing the independent specialists' expertise and relevant experience are provided in **Appendix A**.

Table 1.3: Independent Specialists that contribute to the BA Report

Company	Specialist Area of Expertise	Specialist Name
3Foxes Biodiversity Consulting	Ecology	Simon Todd
3Foxes Biodiversity Consulting	Avifauna	Eric Hermann
EnviroSci (Pty) Ltd	Freshwater	Brian Colloty
TerraAfrica	Soils and Agricultural Potential	Marinè Pienaar
CTS Heritage	Heritage and Palaeontology	Jenna Lavin
Environmental Planning and Design	Visual	Jon Marshall
Savannah Environmental & Neville Bews and Associates	Social	Lisa Opperman with peer review by Neville Bews
SRK	Storm Water Management Plan	Jeandre Thompson

CHAPTER 2: PROJECT DESCRIPTION

This Chapter provides an overview of the project and details related to the project scope, which include the planning/design, construction, operation and decommissioning activities. This Chapter also explores the use of solar energy as a means of power generation.

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

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

Requirement	Relevant Section
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale.	A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale is included in Figure 2.1 .
(h)(ix) the outcome of the site selection matrix;	The outcome of the site selection process undertaken for the identification of the broader study and development area is included in section 2.3.

2.1 Project and Site Description

A broader study area has been identified for the development of McTaggarts PV3 which consists of two properties known as Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452. The broader study area is located within Ward 8 of the Kai !Garib Local Municipality within the greater ZF Mgcawu District Municipality in the Northern Cape Province. The area also borders Ward 11 of the Dawid Kruiper Local Municipality to the east. It is within the affected properties that the development area for McTaggarts PV3 has been identified and located. The development area is ~260ha in extent and is located approximately 24km south-west of the town of Upington. The broader study area and development area can be accessed via the existing Lutzputs gravel road running from the N14 national road in a north-westerly direction along the eastern boundary of the broader study area.

The McTaggarts PV3 development area is located within an area housing a cluster of existing and proposed solar renewable energy projects and grid connection infrastructure. The proposed development area borders the existing Khi Solar One facility (CSP) located to the south and is also situated 7km north of Sirius One (PV) and 8km north-east of the Dyason's Klip 1 and 2 (PV) facilities. The solar PV projects, Sirius One and Dyason's Klip 1 and 2 have been granted environmental authorisations and are currently under construction. In addition, within the vicinity of the broader study area, existing grid connection infrastructure is present which includes the Upington Main Transmission Substation (MTS) located 10km south-east of the development area of McTaggarts PV3.

McTaggarts PV3 will use either fixed tilt, single or double axis tracking photovoltaic (PV) panel technology to harness solar irradiation during the operation phase of the project. A layout has been proposed by the proponent, McTaggarts PV3 (Pty) Ltd, which is included in **Figure 2.1** and assessed in its entirety within this BA Report. A single-circuit, 132kV overhead power line, to be assessed within a 300m wide and 13km long corridor (within a stand-alone BA Report) will connect McTaggarts PV3 to the Upington MTS⁵.

Table 2.1 provides the details of McTaggarts PV3, including the main infrastructure components and services that will be required during the project life cycle.

Table 2.1: Details of McTaggarts PV3 and associated infrastructure

Component	Description / Dimensions
Total extent of the Affected Properties (i.e. Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452)	~2 904.7665ha
Total extent of the Development area ⁶	~260ha
Total extent of the Development footprint ⁷	up to 210ha
Contracted capacity of the facility	75MW
Technology	Static or Tracking Photovoltaic Systems
PV panels	<ul style="list-style-type: none"> » Height: ~3.5m from ground level (installed). » Constructed over an area of up to 195ha » Between 250 000 – 350 000 panels required. » Fixed tilt, single axis or double axis tracking systems. .
On-site Substation	<ul style="list-style-type: none"> » Located on Portion 3 of the Farm McTaggarts Camp 453. » Approximately 1ha in extent. » <u>Either 22kV to 132kV or 33kV to 132kV in capacity</u>
Site access	<ul style="list-style-type: none"> » Direct access to the broader study area and the development area is provided by the Lutzputs gravel road running from the N14 national road. » A 6m wide and 1.4km long main gravel/hard surfaced access road will be constructed to provide direct access from the Lutzputs Road to the development area.
Temporary laydown area	<ul style="list-style-type: none"> » Up to 3ha.
Other infrastructure	<ul style="list-style-type: none"> » Gate and security house » Control centre » Office building » Warehouse » Canteen and visitors centre » Staff locker rooms

⁵ The grid connection solution to connect McTaggarts PV3 to the Upington MTS will include the development of a single-circuit 132kV power line and two collector substations, each including switching station components, as well as associated infrastructure which will be assessed within a separate BA process.

⁶ The area within which the infrastructure for McTaggarts PV3 will be accommodated.

⁷ The area to be covered by the facility layout and infrastructure of McTaggarts PV3.

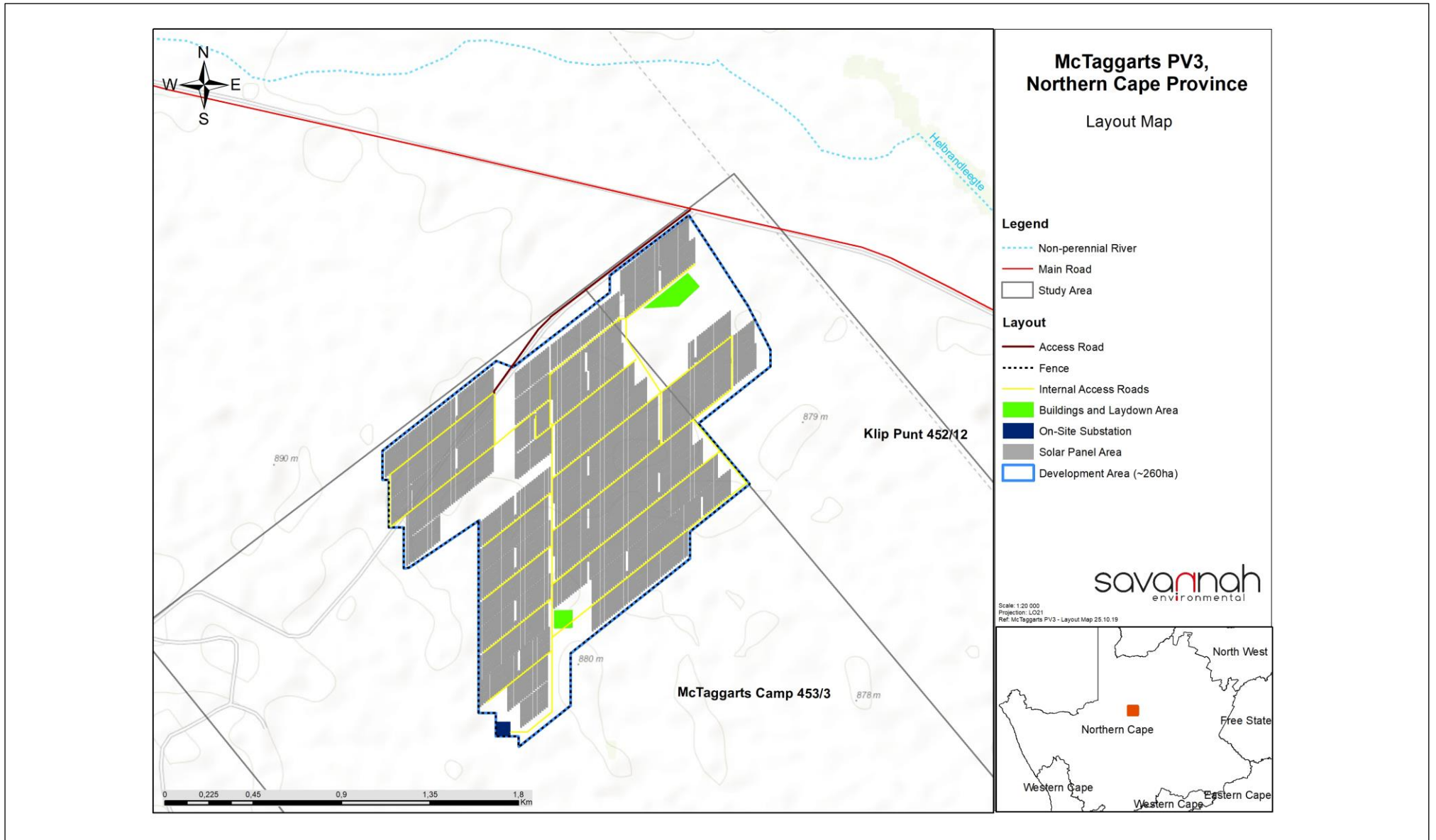


Figure 2.1: Map illustrating the proposed facility layout for McTaggarts PV3 within the development area, which is assessed in this BA Report

2.1 Summary of the Site Selection Process

The affected properties, Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452, are currently owned by Khi CSP South Africa (Pty) Ltd who purchased the land for the development of the Khi Solar One CSP facility located to the south of the development area for McTaggarts PV3. Khi CSP South Africa (Pty) Ltd is a Special Purpose Vehicle (SPV) owned by Abengoa, who also owns the SPV, McTaggarts PV3 (Pty) Ltd, the proponent to the application for the development of McTaggarts PV3.

The greater Upington area is largely located within a REDZ and the Northern Corridor of the Strategic Transmission Corridors, which are areas designated by the South African government for the development of large-scale solar PV facilities and grid connection solution infrastructure.

The detail regarding site-specific characteristics and the motivation for the selection of the broader study and development area for the development of McTaggarts PV3 is provided below:

Broader study area extent, conditions and land availability: Availability of level land of sufficient extent can be a restraining factor for the development of a solar PV facility. McTaggarts PV3 will have a contracted capacity of up to 75MW and would require sufficient space for the placement of infrastructure in order to enable the envisaged contracted capacity. The development area proposed for McTaggarts PV3 is ~260ha in extent, which provides for sufficient space for the solar PV facility and allows for the avoidance of any environmental sensitivities where these may be present.

The following are key considerations:

- » The broader study area and development area terrain conditions are optimal for a development of this nature, with the area being of a suitable gradient.
- » The region within which the broader study area is located can be described as a flat plateau. The area is consistent with the land type and classifies the landscape with an average slope of between 0% and 2% which is suitable for a development of this nature.
- » The development area would comprise ~9% of the total extent of the affected properties (i.e. Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452).

The broader study area is therefore considered suitable and appropriate from a technical perspective for the construction and operation of McTaggarts PV3.

Site access: Access to the broader study area is considered as an important characteristic as appropriate access is required for the transportation of project related infrastructure and heavy machinery during construction. The proximity of the broader study area to viable access routes decreases the traffic impact on secondary roads during the construction and operation phases of the project. The broader study area can be readily accessed via the Lutzputs gravel road, located to the eastern boundary of the broader study area. The N14 national road is also located 10km south of the broader study area and connects the town of Upington with other towns/cities such as Springbok, Aggeneys, Pofadder, Kakamas, Keimoes and Johannesburg.

Considering the readily available site access to the broader study area and the development area, the location of McTaggarts PV3 is considered to be suitable and appropriate.

Land use considerations: The current land use of a site is an important consideration in the site selection process in terms of limiting disruption to existing and possible future land use practices. There is no cultivated agricultural land within the affected properties (as a result of low agricultural potential) that could be impacted upon by the development of McTaggarts PV3. The affected properties, Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452, are currently being used for renewable energy generation and livestock grazing with the Khi Solar One CSP facility being located to the south of the development area for McTaggarts PV3. Other activities present within and around the broader study area include the Sirius One, Dyason's Klip 1 and 2 solar PV projects which are all currently under construction. In addition, other renewable energy projects have been approved by the DEA on directly adjacent properties. These include the following:

Project Name	DEA Reference	Project Status
Kai !Garib CSP ⁸	14/12/16/3/3/2/656	Approved
Khi Solar One	12/12/20/1831	Operational
Sirius Solar PV Project One	14/12/16/3/3/2/469	Under construction
Sirius Solar PV Project Two	14/12/16/3/3/2/470	Approved
Dyasons Klip 1 (RF) (Pty) Ltd	14/12/16/3/3/2/538	Under Construction
Dyasons Klip 2 (RF) (Pty) Ltd	14/12/16/3/3/2/538/1	Under Construction
RE Capital SC (Pty) Ltd	14/12/16/3/3/2/538/2	Approved
Dyasons Klip Solar Energy Facility 1 (Pty) Ltd	14/12/16/3/3/2/705	Approved
Rooipunt CSP	14/12/16/3/3/1/427	Approved

Considering the current land uses and activities undertaken within the broader study area and the surrounding areas, the proposed development is not considered to be in contradiction with these uses and will rather add to the current activities being undertaken. Therefore, the location of the broader study area is considered to be acceptable in this regard.

Grid connection considerations: Ease of access into the Eskom national electricity grid is vital to the viability of a solar PV facility and addresses Eskom's concerns for lower cost connection alternatives given current funding constraints. Solar PV facilities that are located near a grid connection point and/or demand centre are favourable and reduce the losses associated with power transmission. Various existing grid connection infrastructure is located within the general Upington area and the broader study area. These include both power lines and substations, namely:

- » Oasis / Oranje Switching Station 1 132kV power line;
- » Gordonia / Oranje Switching Station 1 132kV power line;
- » Oranje Switching Station;
- » Olyfenhout Substation;
- » McTaggarts Substation (as part of the Khi Solar One facility); and
- » Upington Main Transmission Substation (MTS)

⁸ Previously called the Upington Solar Thermal Plant Two

The grid connection point for McTaggarts PV3 will be the existing Uppington MTS located 10km to the south-east of the development area. In order to connect McTaggarts PV3 to the national grid, a grid connection solution comprising specific grid connection infrastructure needs to be developed. The grid connection infrastructure is to be assessed as part of a separate application for environmental authorisation and BA process.

2.4 PV Technology considered for McTaggarts PV3 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.

A PV cell is made of silicon acting as a semi-conductor and used to produce the photovoltaic effect. Individual PV cells are linked and placed behind a protective glass sheet to form a PV panel. 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 (DC⁹) to alternating current (AC¹⁰). The electricity is then stepped up to a higher voltage via a transformer before being evacuated into the national grid via a power line.

The Photovoltaic Effect is achieved using the following components:

Photovoltaic Cells

A PV cell is made of silicon that acts as a semiconductor used to produce the photovoltaic effect. A single cell is sufficient to power a small device such as an emergency telephone. However, to produce up to 75MW of power, the solar PV facility will require numerous cells arranged in multiples/arrays which will be placed behind a protective glass sheet and fixed to a support structure. Each PV cell is positively charged and negatively charged on each side, with electrical conductors attached to either side to form a circuit. This circuit captures the released electrons in the form of an electrical current (DC).

The Inverter

An inverter is used to convert the electricity which is produced as direct current into alternating current for the purpose of grid connection. In order to connect a large solar PV facility to the national grid, numerous inverters will be arranged in several arrays to collect and convert the produced power.

⁹ DC (direct current) is the unidirectional flow or movement of electric charge carriers (which are usually electrons). The intensity of the current can vary with time, but the general direction of movement always stays the same. 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://whatistechtarget.com/definition/DC-direct-current/>)

¹⁰ An alternating current (AC) occurs when charge carriers in a conductor or semiconductor 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://whatistechtarget.com/definition/alternating-current-AC/>).

The Support Structure

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 2.2**). PV panels which utilise fixed / static support structures are set at an angle (fixed-tilt PV system) so as to optimise the amount of solar irradiation. With fixed / static support structures the angle of the PV panel is dependent on the latitude of the proposed development and may be adjusted to optimise for summer and winter solar radiation characteristics. PV panels that utilise tracking support structures track the movement of the sun throughout the day so as to receive the maximum amount of solar irradiation.

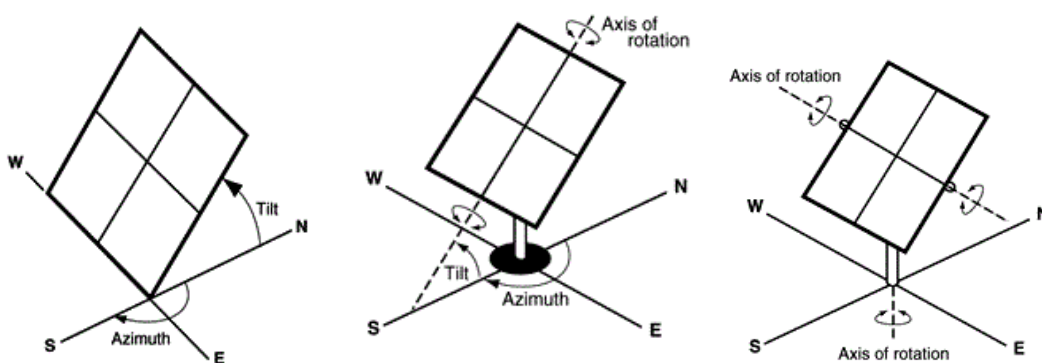


Figure 2.2: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking) (Source: pveducation.com).

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

2.5 Activities during the Project Development Stages

In order to develop McTaggarts PV3 and its associated infrastructure, a series of activities will need to be undertaken during the design, pre-construction, construction, operation, and decommissioning phases which are discussed in more detail below.

2.5.1 Design and Pre-Construction Phase

Pre-planning: Several post-authorisation factors are expected to influence the final design of the facility and could result in small-scale modifications of the PV array and/or associated infrastructure. While an objective of the Engineering, Procurement and Construction (EPC) Contractor, who will be responsible for the overall construction phase of the project, will be to comply with the approved facility design as far as possible, it should be understood that the construction process is dynamic and that unforeseen changes to the project specifications will take place. This BA 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 DEA. Importantly, should there be any substantive changes or deviations from the original scope or layout of the project following the layout being approved, the DEA will need to be notified and where relevant, approval obtained.

Conduct surveys: Prior to initiating construction, several 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 substation and the facility's associated infrastructure) and a geotechnical survey. Geotechnical surveys are executed by geotechnical engineers and geologists to acquire information regarding the physical characteristics of soil and rocks underlying a proposed site. The purpose is to design earthworks and foundations for structures and to execute earthwork repairs necessitated due to changes in the subsurface environment.

2.5.2 Construction Phase

The construction phase will entail a series of activities including:

Procurement and employment

McTaggart PV3 is likely to create approximately 300 (at its peak) temporary employment opportunities for a period of ~12 to 18 months, depending on the final design, during the construction phase. Approximately 60% of the opportunities will be available to low skilled workers (construction labourers, security staff, drivers, equipment operators etc.), 25% will be available to semi-skilled personnel (electricians, site managers etc.) and 15% of employment opportunities will be available to skilled individuals (engineers, project managers, site managers etc.). Solar PV facilities make use of high numbers of low skilled and semi-skilled labour during the construction phase which provides opportunity to local labour, where available within the surrounding areas and towns. Employment opportunities for McTaggart PV3 will peak during the construction phase and significantly decline during the operation phase.

Establishment of an Access Road to the Broader Study Area

The broader study area is accessible via the existing Lutzputs gravel road (D3276) off the N14 national road, which is located to the east. Within the broader study area itself, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). A main access road, which will be gravel in nature or tarred where necessary, will route from the Lutzputs gravel road in a southerly direction towards the broader study area. The road will be 6m wide and 2.5km long. Furthermore, a network of internal access roads, also gravel in nature will be required, to route between the various project components. The internal access roads will be 5m wide with a combined length of 13km.

Undertake Site Preparation

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

Water Usage and Waste Requirements

During the construction phase water will be required for the undertaking of the required construction activities as well as for potable use. For the duration of the construction phase (i.e. 12-18 months) ~12 250m³ of water will be required. Water for the construction phase will be sourced directly from the Kai !Garib Local Municipality.

Services Required

During the construction phase specific services will be required for the undertaking of the construction activities. The services required include refuse material disposal and sanitation. Chemical toilets will be the

primary source of effluent collection. Any other effluent discharge during the construction phase will be collected in sealed containers/tanks and collected via a honey-sucker truck and treated by a service provider (either the local municipality or a Contractor) at a licensed disposal site.

Transport of Components and Equipment to Site

The components for the solar PV facility will be transported to site by road. For McTaggarts PV3, transport of the components would be via the N14 and Lutzputs roads. Some of the components (i.e. substation transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)¹¹ by virtue of the dimensional limitations. Typical civil engineering construction equipment will need to be brought to the 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 substation and site preparation.

Establishment of Laydown Areas on Site

A temporary laydown and storage area will be required for the typical construction equipment. Once the required equipment has been transported to site, a dedicated equipment construction camp and a laydown area (of approximately up to 3ha in extent) will be established. The equipment construction camp serves to confine activities and storage of equipment to one designated area and to limit the potential ecological impacts associated with this phase of the project. The laydown area will be used for the storage of the PV panels and the general placement/storage of construction equipment.

Erect PV Panels and Construct Substation and Invertors

The construction phase involves installation of the solar PV panels and the 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 substation.

¹¹ A permit will be required for the transportation of these abnormal loads on public roads.



Figure 2.3: Frame, structural details (Photo courtesy of Igeteam, 2011).

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

Establishment of Ancillary Infrastructure

Ancillary infrastructure will include the cabling for the connection to the Eskom national grid, workshop and maintenance building, storage and laydown areas, gatehouse, security offices, and other storage areas under roof. The establishment of these facilities/buildings will require the localised clearing of vegetation and levelling of the development area and the excavation of foundations prior to construction.

Undertake Site Remediation

Once construction is completed and all construction equipment is removed, the site must be rehabilitated where practical and reasonable. On full commissioning of the solar PV facility, any access points to the site that are not required during the operation phase must be closed and rehabilitated.

2.5.3 Operation Phase

McTaggarts PV3 is expected to be operational for a minimum of 20 years. The facility will, under normal operating conditions, operate continuously, 7 days a week.

Key elements of the Operation and Maintenance plan include monitoring and reporting the performance of the facility, conducting preventative and corrective maintenance, receiving visitors, and maintaining security of the project. The operation phase of McTaggarts PV3 will create a maximum of approximately 30 full-time employment opportunities. The number of skilled personnel during the operation phase will comprise 5%, semi-skilled 25% and low-skilled 70%. Employees that could be sourced from the local municipal pool include the less skilled and semi-skilled such as safety and security staff and certain maintenance crew. Highly skilled personnel may need to be recruited from outside the local area.

Water will be required for the operation phase of McTaggarts PV3. Approximately 5 372m³ of water per annum will be required for the operation of the solar PV facility, which is anticipated to be 20 years. The water required will be sourced directly from the Kai !Garib Local Municipality (through a Service Level Agreement).

Other services required for the operation of McTaggarts PV3 include refuse material disposal and sanitation. No effluent is anticipated to be produced during the operation phase, except for normal sewage due to the presence of the operations staff. The sewage generated over this period will be collected and treated as per normal standards using a septic or conservancy tank. Should the local municipality not permit the use of the septic tank, sewage will be stored in the conservancy tank and collected either by a honey-sucker truck or by a service provider (contractor) for treatment at a licensed disposal site.

2.5.4 Decommissioning Phase

Depending on the continued economic viability of McTaggarts PV3 following the initial 20-year operation period, the solar PV 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 disassembled and replaced with new, more efficient technology/infrastructure available at that time. However, if the decision is made to decommission the solar PV facility, the following activities will form part of the project scope.

Site Preparation

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

Disassemble and Remove Existing Components

When the solar PV facility is ultimately decommissioned, the equipment to be removed will depend on the proposed future land use for the site at that time. At this time, all above ground facilities that are not intended for future use at the site will be removed. Underground equipment (e.g. foundation, wiring) will be removed, and the surface restored. 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 plant would be deconstructed and recycled or disposed of in accordance with regulatory requirements. The site will be rehabilitated and returned to a beneficial land use.

Future plans for the site and infrastructure after decommissioning

The capacity of McTaggarts PV3 would have degraded by ~15% over 20 years. The expectation is that the development area will be used for future renewable energy procurement as the operation phase approaches the termination date of the 20-year Power Purchase Agreement (PPA). If decommissioning were to occur, it would be 20 years (or the stated years) after the commencement of the PPA. Another option for the site after decommissioning is for a compatible land use, such as grazing, to resume following site rehabilitation.

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for McTaggarts PV3 as part of the BA Process.

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

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

Requirement	Relevant Section
(g) a motivation for the preferred site, activity and technology alternative;	A motivation for the preferred development area, activity and technology alternative is included in section 3.2, and 3.2.2.1.
(h)(i) details of all the alternatives considered;	The details of all alternatives considered are included in section 3.2.
(h)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such.	A motivation for not considering any alternative development locations is included in section 3.2.2.1.
(h) (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity	A concluding statement indicating the preferred alternatives, including the preferred location of the activity is included in section 3.2.2.1 and 3.2.2.

3.2. Alternatives Considered during the BA Process

Appendix 1 of the 2014 EIA Regulations (as amended), provide that a BA Report must contain a motivation for the preferred site (i.e. broader study and development area), activity and technology alternative. The identified broader study and development area for McTaggarts PV3 is located within a REDZ area (also known as the Upington REDZ) which is a strategic area identified by the DEA (soon to be known as DEFF) for the development of large-scale renewable energy projects. At least 5 solar PV renewable energy facilities have been approved by the Department, one operational CSP (i.e. Khi Solar One) and three PV facilities currently under construction (i.e. Dyasons Klip 1, 2 and Sirius One solar PV projects) are within the vicinity of the broader study area.

A site selection process for the identification of the McTaggarts PV3 development area was undertaken by the developer. This process consisted of identifying a number of characteristics deemed to be essential for development of a competitive solar PV facility. The characteristics considered include the extent of land available, favourable solar radiation levels, lack of environmentally sensitive features, land availability of the area considered for development, availability and ease of site access, existing and proposed land use activities, grid connection infrastructure within the area and the ease of access to the infrastructure. The broader study area, development area and directly surrounding areas are considered to contain the necessary characteristics as identified by the developer for the proposed solar PV facility and provides opportunity for a development of this nature.

Taking the above into consideration, no alternative site has been assessed within this BA process for the development of McTaggarts PV3 and the DEA 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; and
- » Fundamentally (totally) different alternatives to the project.

The following sections of this Chapter will further substantiate why an alternative site has not been assessed for the development of McTaggarts PV3. The sections will further discuss the activity and technology alternatives assessed within the BA process for this development.

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

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

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

3.2.2.1. Property or Location Alternatives

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, availability of grid connection, the extent of the site and the need and desirability for the project (discussed in detail in Chapter 5). McTaggarts PV3 (Pty) Ltd as the proponent, considers the preferred development area placed within the broader study area as being highly favourable and suitable for the establishment of a solar PV facility due to the following site-specific and favourable characteristics:

- » **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 broader study area is in the region of approximately 2278kWh/m²/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.
- » **Topography:** The broader study area consists of extensive to irregular plains on a slightly sloping plateau sparsely vegetated with an average slope of between 0% and 3%. The development area of the project is situated between elevations 865m and 874m above sea level, with an average elevation of 870m. This area generally has a gradual south facing slope (2.0%). The flat topography of the area under investigation is considered as beneficial in terms of the construction activities that will be required.
- » **Site extent:** The affected properties (i.e. Portion 12 of the Farm Klip Punt 452 and Portion 3 of the Farm McTaggarts Camp 453), known as the broader study area, is approximately 2 904.7665ha in extent, which is sufficient for the installation of a facility with a contracted capacity of up to 75MW and allowing for avoidance of environmental site sensitivities. A development area of ~260ha has been identified within the affected properties within which the solar PV facility will be sited. The development footprint of the facility, i.e. facility infrastructure, would occupy an area of ~210ha, which is equivalent to approximately 80.77% of the extent of the development area.
- » **Site access:** Access to the broader study area and development area is provided via the existing Lutzputs gravel road (D3237) that is located to the east of the broader study area. The Lutzputz Road is linked to the N14, located to the south. The N14 links the town of Upington with other major towns in the Province, such as Keimoes, Kakamas and Springbok.
- » **Grid access:** A key factor in the siting of any solar PV project is that the project must have a viable grid connection. The Upington Main Transmission Substation (MTS) is located approximately 10.53km south-east of the development area and is proposed as the preferred grid connection point for the facility. In terms of Eskom's 2018 – 2027 Transmission Development Plan (TDP), the document currently stipulates the following grid rollouts for this substation:

Project Name	Capacity (kV)	Project Status
2 x Upington – Aries	400	To be constructed
Upington – Niewehoop	400	To be constructed
Upington – Ferrum	400	To be constructed

Existing grid infrastructure (i.e. power lines and substations) within close proximity to McTaggarts PV3 provide an opportunity for the project to connect to the national grid with minimal new linear infrastructure (i.e. of less than 15km) required to be developed. In order to connect the project to the national grid through the use of the Upington MTS, a grid connection solution comprising specific grid connection infrastructure will be required¹³.

- » **Land suitability:** The current land use of the development area is an important consideration for site selection in terms of limiting disruption to existing land use practices. The affected properties are currently used for grazing by livestock and for renewable solar energy generation. Grazing land was preferred for the siting of the project as the majority of farming practices can continue in tandem to the operation of the solar PV facility once the construction and commissioning of McTaggarts PV3 is complete. Sites that facilitate easy construction conditions (i.e. relatively flat topography, lack of major rock outcrops etc.) are also favoured during site selection and the proposed development area fits this criterion.
- » **Geographic location:** The broader study and development area are located within the Upington REDZ 7 which is a node identified by National Government for the development of renewable energy projects. Development of renewable energy projects within the areas has been on-going in the area with the following solar energy facilities located in close proximity to the development area: the operational Khi Solar One and the currently under construction Sirius One, Dyasons Klip 1 and 2 solar PV projects (refer to **Figure 3.1**). The development area is adjacent to an existing cluster or node of existing (with some busy with construction) and proposed renewable energy developments, which compliments existing and future land use activities in the Upington area and is in line with the vision of National Government through the promulgation of the REDZ areas.
- » **Landowner support:** The selection of a site where the landowner is supportive of the development of a renewable energy facility is essential for ensuring the success of the project. The affected properties, Portion 12 of the Farm Klip Punt 452 and Portion 3 of the Farm McTaggarts Camp 453, are currently owned by Khi CSP South Africa (Pty) Ltd who purchased the land for the development of the Khi Solar One. McTaggarts PV3 (Pty) Ltd, the proponent for this application, has entered into a notarial lease agreement with the landowner Khi CSP South Africa (Pty) Ltd. The landowner is therefore in favour of the development and does not view the establishment of the solar PV facility as a conflict with the current land use practices.

Based on the above site-specific attributes, the proponent considers the development area located within the broader study area as highly preferred for the development of a solar PV facility, and expects that McTaggarts PV3 will be able to draw on synergies with existing and under construction projects within the vicinity of the broader study area. As a result, no location/PV alternatives are proposed as part of this BA process.

¹³ The grid connection solution to connect McTaggarts PV3 to the Upington MTS will be assessed within a separate BA process. The grid connection infrastructure will include two collector substations, each including a switching station component, and a 132kV single-circuit power line.

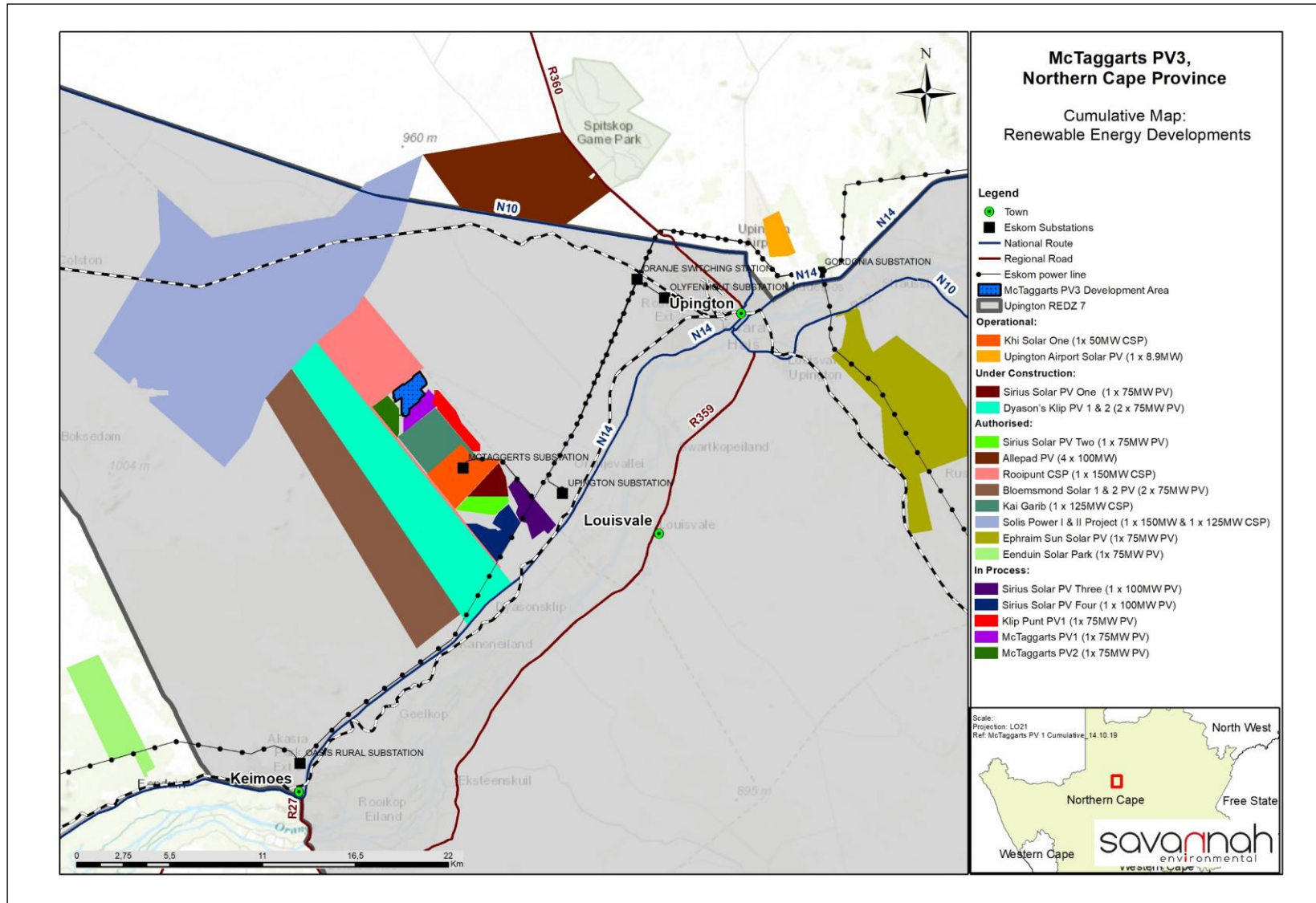


Figure 3.1: A Cumulative Map showing the location of other solar energy facilities in relation to McTaggarts PV3, as well as the Upington REDZ area

3.2.2.2. Design and Layout Alternatives

McTaggarts PV3 will have a development footprint of approximately 210ha, to be located within the development area of approximately 260ha (which is positioned within the boundaries of Portion 12 of the Farm Klip Punt 452 and Portion 3 of the Farm McTaggarts Camp 453 which are both equivalent to 2 904.7665ha in extent). Specialist field surveys and assessments were undertaken as part of the BA process in order to provide the proponent with site specific information regarding the broader study area and the development area considered for the development (refer to **Appendices D-K**). Prior to the finalisation of the layout assessed in this BA Report, the proponent undertook extensive consultations with ecological, avifauna and freshwater specialists to delineate areas of environmental sensitivity within the broader study area in order ensure that the placement of the solar PV facility and the associated infrastructure does not have a significant and negative impact on the environment and is appropriately placed within the broader study area. Therefore, areas to be avoided by the development were identified, specifically relating to ecological, avifaunal and hydrological features and sensitivities present within the broader study area being considered. The identified sensitivities were utilised as a tool by the proponent to identify and locate the development area within the broader study area. This was undertaken with the aim of avoiding possible highly sensitivity areas within the broader study area so as to limit impacts associated with the development.

As a result, the preferred development area (260ha) within the affected properties (i.e. 2 904.7665ha in extent) is considered as the most feasible and appropriate location for McTaggarts PV3, based on the following considerations:

- i) Through consultation with specialists, outside the BA process, the proponent was made aware of areas within the broader study area of a high ecological, avifaunal and hydrological sensitivity. The proponent acknowledged these sensitivities and has proposed the development area and the development footprint in areas within the broader study area that avoid high environmental sensitivities that were identified during this process;
- ii) the landowner is in support for the development area of the solar PV facility within this particular portion of the broader study area;
- iii) the development area is considered suitable for the development of a solar PV facility from a technical perspective to ensure the success of the development.

Considering the process undertaken above, including the consideration of the on-site sensitivities and their avoidance, a reduction in the on-ground impacts and the opportunity that the development area presents for the development of McTaggarts PV3, no layout alternative is proposed for assessment.

3.2.3. **Technology Alternatives**

The Upington area has been identified for the development of solar energy renewable facilities, however, the area is considered not suitable for the development of wind energy projects due to the low average wind speeds.

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 2019 Integrated Resource Plan (IRP), 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 broader study area and consists of a lower visual profile and limited water requirements when compared to the CSP technology option. The development area of McTaggart PV3 in close proximity to the Khi Solar One CSP facility provides an opportunity to optimally use a site that is currently used for energy generation through making use of solar technology, but with reduced visual intrusion and/or cumulative visual impacts, and reduced water use requirements.

Therefore, considering the above, no other technology alternatives are being assessed for the development of McTaggart PV3, and the development of solar PV on the site is considered as the best option for the area considering the current installed technology on the site, the ample solar resource available (proven by the already existing operational CSP facility) and the potential resource saving in terms of water requirements in an area experiencing extreme drought conditions.

When considering PV as a technology for the development of a solar facility, two types of panels could be installed, which include:

- » 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, which affect the potential for environmental impacts, relate to the extent of the facility, as well as the height of the facility (visual impacts). For example, 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. 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 McTaggart PV3. Should this alternative be selected, there would be no environmental impacts or benefits as a result of the construction and operation activities associated with a solar PV facility. The 'Do-Nothing' alternative has been assessed as part of the BA process (refer to **Chapter 8** and **Chapter 10** of this BA Report).

CHAPTER 4: POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policy and legislative context within which the development of a solar PV facility such as McTaggart PV3 is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process which may be applicable to or have bearing on the proposed project.

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

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

Requirement	Relevant Section
(e) a description of the policy and legislative context within which the development is proposed including-	A description of the policy and legislative context within which McTaggart PV3 is proposed is included in section 4.3, 4.4, 4.5 and 4.6.
(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report.	
(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.	

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 Energy¹⁴. 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 McTaggart 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

¹⁴ The Department of Energy is soon to become the Department of Mineral Resources and Energy

the approval process of a solar energy project and the related statutory environmental assessment process.

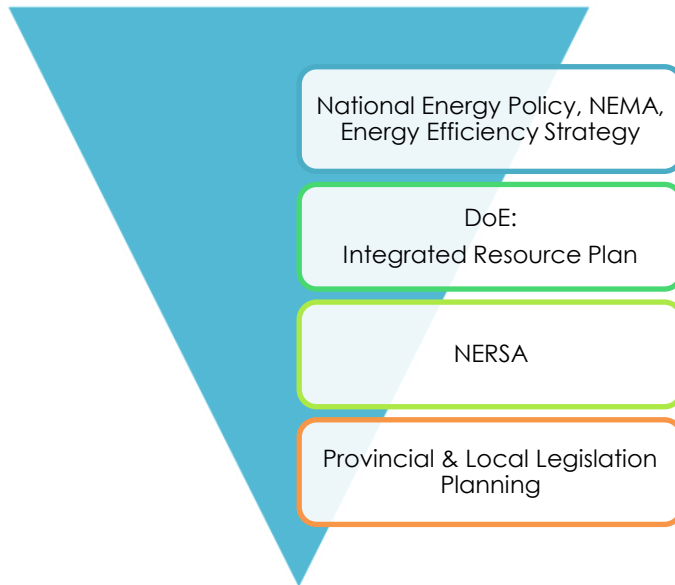


Figure 4.1: Hierarchy of electricity and planning documents

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

- » **Department of Energy (DoE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity.
- » **Department of Mineral Resources (DMR):** This Department is responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (No. 28 of 2002) (MPRDA) in terms of Section 53 of the MPRDA. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resource that may occur within the broader study area and development area.
- » **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 Environmental Affairs (DEA)¹⁵:** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the 2014 EIA Regulations (GN R326) as amended. DEA is the competent authority for this project (as per GNR 779 of 01 July 2016), and is charged with granting the EA for the project under consideration.
- » **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.

¹⁵ The Department of Environmental Affairs (DEA) is soon to become the Department of Environment, Forestry and Fisheries (DEFF).

- » **Department of Water and Sanitation¹⁶:** 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, Forestry and Fisheries (DAFF)¹⁷:** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).

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

- » **Provincial Government of the Northern Cape – Northern Cape Department of Environment and Nature Conservation (DENC):** This Department is the commenting authority for the BA process for the project and is responsible for issuing of other 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 manage 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 Kai !Garib Local Municipality and Dawid Kruiper Local Municipality¹⁸ which form part of the ZF Mgcawu District Municipality. In terms of the Municipal Systems Act (No. 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

4.3 National Policy

Further to the South African government's commitment in August 2011 to support the development of renewable energy capacity, the DoE initiated the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme to procure renewable energy from the private sector in a series of rounds. To date, the Department has procured 6 422MW of renewable energy capacity from 102 independent power producers (IPPs), with 3 876MW operational and made available to the grid¹⁹.

¹⁶ The Department of Water and Sanitation (DWS) is soon to become the Department of Human Settlements, Water and Sanitation.

¹⁷ The Department of Agriculture, Forestry and Fisheries is soon to become the Department of Agriculture, Rural Development and Land Reform

¹⁸ The Dawid Kruiper Local Municipality is directly adjacent to the boundary of the McTaggart PV3 broader study area and will not be directly impacted by the proposed development.

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

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 4.1**. The development of McTaggarts PV3 is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.1: Relevant national legislation and policies for McTaggarts PV3

Relevant legislation or policy	Relevance to McTaggarts PV3
Constitution of the Republic of South Africa, 1996	<p>Section 24 of the Constitution pertains specifically to the environment. It states that Everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</p> <p>The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts.</p>
National Environmental Management Act (No. 107 of 1998) (NEMA)	<p>This piece of legislations 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.</p> <p>The national environmental management principles state that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.</p> <p>The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.</p>
White Paper on the Energy Policy of the Republic of South Africa (1998)	<p>The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of RE and encouraging new entries into the generation market.</p> <p>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.</p>
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	<p>The White Paper on Renewable Energy Policy supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of RE and aims to create the necessary conditions for the development and commercial implementation of RE technologies.</p>

Relevant legislation or policy	Relevance to McTaggart PV3
	<p>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.</p> <p>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.</p>
National Energy Act (No. 34 of 2008)	<p>The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking environmental management requirements into account. In addition, the Act also provides for energy planning, and increased generation and consumption of Renewable Energies (REs).</p> <p>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. It also provides the legal framework which supports the development of RE facilities for the greater environmental and social good.</p>
The Electricity Regulation Act (No. of 2006)	<p>The Electricity Regulation Act of 2006, replaced the Electricity Act (No. 41 of 1987), as amended, with the exception of Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator (NERSA) as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which the generation, transmission, distribution, trading, and import and export of electricity are regulated.</p>
Integrated Energy Plan (IEP), 2015	<p>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.</p>
Integrated Resource Plan for Electricity (IRP) 2010-2030 (2011)	<p>The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.</p> <p>On 27 August 2018, the then Minister of Energy published a draft IRP which was issued for public comment. The lengthy public participation and consultation process has</p>

Relevant legislation or policy	Relevance to McTaggart PV3
	<p>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:</p> <ul style="list-style-type: none"> » A total of 6 422MW has been procured thus far under the REIPPPP, with 3 876MW being currently operational and made available to the grid. In addition, IPPs have commissioned 1005MW from the 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. <p>Provision has been made for the following new capacity by 2030:</p> <ul style="list-style-type: none"> 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. <p>Based on the 2019 IRP, 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.</p>
<p>National Development Plan 2030 (2012)</p>	<p>The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030.</p> <p>In terms of the Energy Sectors role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:</p> <ul style="list-style-type: none"> » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. <p>The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy.</p>
<p>Strategic Integrated Projects (SIPs)</p>	<p>The Presidential Infrastructure Coordinating Commission (PICC) are 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.</p>

Relevant legislation or policy	Relevance to McTaggart PV3
	<p>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.</p> <p>The development of McTaggart 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.</p>
<p>National Climate Change Response Policy, 2011</p>	<p>The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 and ratified in 1994. It provides the overall global policy framework for addressing climate change and marks the first international political response to climate change. The UNFCCC sets out a framework for actions aimed at stabilising atmospheric concentrations of GHGs to avoid dangerous anthropogenic interference with the climate system.</p> <p>The UNFCCC has established a variety of arrangements to govern, coordinate and provide for oversight of the arrangements described in the documentation. The oversight bodies take decisions, provide regular guidance, and keep the arrangements under regular review in order to enhance and ensure their effectiveness and efficiency. The Conference of Parties (COP), established by Article 7 of the Convention, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention.</p> <p>The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. 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.</p> <p>South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary.</p> <p>South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and</p>

Relevant legislation or policy	Relevance to McTaggart PV3
	<p>42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively.</p> <p>The policy provides support for McTaggart 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.</p>
Climate Change Bill, 2018	<p>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.</p> <p>McTaggart PV3 consists of a renewable energy generation facility and would not result in the generation or release of emissions during its operation.</p>

4.4 Provincial Planning and Context

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

Table 4.2: Relevant provincial legislation and policies for McTaggart PV3

Relevant policy	Relevance to McTaggart PV3
Northern Cape Provincial Spatial Development Framework (PSDF) 2012	<p>The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the province is to enable sustainability through sustainable development. The province considers social and economic development as imperative in order to address the most significant challenge facing the Northern Cape, which is poverty.</p> <p>The PSDF identifies key sectoral strategies and plans which are considered to be the key components of the PSDF. Sectoral Strategy 19 refers to a provincial renewable energy strategy. Within the PSDF a policy has been included which states that renewable energy sources (including the utilisation of solar energy) are to comprise 25% of the province's energy generation capacity by 2020.</p> <p>The overall energy objective for the province also includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the province through appropriate financial and fiscal instruments.</p>
The Northern Cape Climate Change Response Strategy	<p>The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: <i>"The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key. Sectors to ensure proactive long-term responses to the frequency and intensity of extreme weather events such as flooding and wildfire, with</i></p>

Relevant policy	Relevance to McTaggart PV3
	<p><i>heightened requirements for effective disaster management”.</i></p> <p>Key points from the MEC address include the NCPG's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the NCP's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The MEC further indicated that the NCP was involved in the processing 7 wind energy facility and 11 solar energy facility EIA applications (March 2011)²⁰.</p> <p>The development of McTaggart PV3 will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape.</p>

4.5 Local Policy and Planning Context

The local tiers of government within which McTaggart PV3 is located are the Kai !Garib Local Municipality and the ZF Mgcawu District Municipality. The broader study area for McTaggart PV3 also borders the Dawid Kruiper Local Municipality to the east. The development instruments or policies at both the district and local level contain objectives which are in line with the development of McTaggart PV3. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 4.3: Relevant district and local legislation and policies for McTaggart PV3

Relevant policy	Relevance to McTaggart PV3
<p>ZF Mgcawu District Municipality Draft Integrated Development Plan (IDP), 2018/2019 (2017-2022)</p>	<p>The vision of the ZF Mgcawu DM is “Quality support to deliver quality services.” The mission of the ZF Mgcawu DM is “Centre of excellence in providing quality basic services through support to local municipalities.”</p> <p>The following strategic and development objectives have been identified for the ZF Mgcawu DM:</p> <ul style="list-style-type: none"> » To monitor and determine the housing backlogs in the district as well as to eradicate sanitation & infrastructure backlogs » To assess and provide targeted support improving institutional capacity and service delivery capabilities of category B-municipalities » To promote environmental health and safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of environmental health services, fire and disaster risks » To promote safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of fire and disaster risks » To Facilitate the Development of Sustainable regional land use, economic, spatial and

²⁰ (www.info.gov.za/speech/DynamicAction?pageid=461&sid=22143&tid=45200).

Relevant policy	Relevance to McTaggart PV3
	<p>environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy</p> <ul style="list-style-type: none"> » To market, develop and co-ordinate tourism in the ZF Mgcawu District » To assess and monitor the status of infrastructure needs and requirements of B Municipalities » To ensure efficient business operations and to fulfil the assurance statutory requirements of the ZF Mgcawu District Municipality <p>The strategic objective of supporting and guiding the development of a diversified, resilient and sustainable district economy, and the development objectives of creating investment opportunities in sectoral development (i.e. investment activities, Entrepreneurial business support programme), and enabling an environment for business establishment and support initiatives (i.e. Increase the number of businesses, entrepreneurial support) through its local content and local economic development requirements as prescribed under the REIPPP Programme will be supported through the proposed development.</p>
<p>Kai !Garib Local Municipality Integrated Development Plan 2019/2020 (June 2019)</p>	<p>There are six established Independent Power Producers located within the municipality. These projects include Khi Solar One CSP facility, which is located on the same property as McTaggart PV3, Aries Solar (Solar PV), Neusberg Hydro Electric Project A (Hydro), Dyasons Klip 1 (Solar PV), Dyasons Klip 2 (Solar PV) and Sirius Solar PV Project One (Solar PV).</p> <p>The Kai !Garib LM has identified that there is potential for further IPP projects to become operational in the LM, with several already in the planning stages. Kai !Garib LM is also a participant in the ZF Mgcawu Development Forum, an initiative coordinated by the Industrial Development Corporation (IDC) which aims to ensure that integrated development planning and implementation of regional projects take place. This includes the renewable energy and mining plants, together with other industry stakeholders such as agricultural, business and civil society stakeholders. Kai !Garib LM recognises the importance of participating in this forum to provide a platform for partnerships for regional socio-economic growth.</p>
<p>Dawid Kruijer Local Municipality Final Reviewed Integrated Development Plan for 2019/2020 (approved on 30 May 2019)</p>	<p>The LM identified, through the undertaking of a community and stakeholder analysis, key priority issues. Issues relating to energy and electricity have been identified and includes electricity provision to all in need and the upgrading of electricity infrastructure.</p> <p>The LM confirms that it is involved in the national programme for the development of solar power installations in the Upington area. Furthermore, the electricity sector is one of the fastest growing sectors in the municipality and it is considered that the sector must be exploited to ensure the creation of new job opportunities for local people.</p>

Relevant policy	Relevance to McTaggarts PV3
<p>Dawid Kruiper All-inclusive Spatial Development Framework Final Report (February 2018)</p>	<p>The IDP (as discussed above) identified the following 8 pillars as being important for development and the Dawid Kruiper Council's envisagement of a self-sustaining ecology with long-term benefit for all inhabitants of Dawid Kruiper:</p> <ol style="list-style-type: none"> 1. Agriculture 2. Manufacturing and industry 3. Tourism as a sustainable industry 4. Urban development 5. Rural development 6. Social Development 7. Conservation of natural habitats 8. Natural resources <p>According to the Dawid Kruiper LM SDF the area under investigation is located within the C.a.2 Agriculture (Ward 11) Spatial Planning Category (SPC).</p> <p>The implementation of McTaggarts PV3 is not considered to be in contrast with the Dawid Kruiper LM SDF and the SPC within which the project is located.</p> <p>In addition, the REIPPP Programme requires preferred bidders to make contributions towards local economic development and social upliftment, to be focused on benefitting local communities within the vicinity of the development area.</p>

4.6 International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of McTaggarts PV3 are provided below in **Table 4.4**. McTaggarts PV3 is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.4: International policies relevant to McTaggarts PV3

Relevant policy	Relevance to McTaggarts PV3
<p>United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)</p>	<p>The Conference of the Parties (COP), established by Article 7 of the UNFCCC, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention.</p> <p>The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. 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.</p> <p>South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the</p>

Relevant policy	Relevance to McTaggart PV3
	<p>date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary.</p> <p>Following COP21, countries met in Katowice, Poland from 2 December to 14 December 2018 for COP24. Countries agreed on various elements from COP21 held in Paris in 2015, which pertained to how governments will measure, report and verify their emission-cutting efforts, which was a key element as it ensured all countries are held to proper standards and will find it difficult to renege from the signed agreements.</p> <p>There was, however, a disagreement amongst countries over carbon credits which are awarded to countries for their emission-cutting efforts and their carbon sinks, such as forests, which absorb carbon. The emission count towards countries' emission-cutting targets. Brazil, which hoped to benefit from its large rainforest cover, insisted on a new form of wording which would allow double counting of credits, undermining the integrity of the system. This issue was put on hold and will be discussed at the COP25, to be held in Santiago de Chile, Chile. Largely absent from the COP24 discussions was the question of how countries will step up their targets on cutting emissions. On current targets, the world is set for 3° of warming from pre-industrial levels, which scientists have said would be disastrous, resulting in droughts, floods, sea level rises and the decline of agricultural productivity. However, in 2019, the United Nations will meet again in Chile to discuss the final elements of the COP21 agreement and begin to work on future emission targets²¹.</p> <p>South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively.</p> <p>The policy provides support for McTaggart 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.</p>
<p>The Equator Principles III (June 2013)</p>	<p>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</p>

²¹ <https://www.theguardian.com/environment/2018/dec/16/what-was-agreed-at-cop24-in-poland-and-why-did-it-take-so-long>

Relevant policy	Relevance to McTaggart PV3
	<p>infrastructure projects (such as McTaggart PV3) and apply globally to all industry sectors.</p> <p>Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of McTaggart 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.</p> <p>McTaggart PV3 is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, 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.</p>
<p>International Finance Corporation (IFC) Performance Standards and Environmental and Social Sustainability (January 2012)</p>	<p>The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012.</p> <p>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.</p> <p>Given the nature of McTaggart 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.</p>

CHAPTER 5: NEED AND DESIRABILITY

Appendix 1 of the 2014 EIA Regulations (as amended) requires the inclusion of 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. This Chapter provides an overview of the anticipated suitability of McTaggart PV3 being developed at the preferred location from an international, national, regional, and site-specific perspective. It also 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 a Basic Assessment Report

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

Requirement	Relevant Section
3(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location.	The need and desirability for the development of McTaggart PV3 is included and discussed as a whole within this chapter. The need and desirability for the development of the solar PV facility has been considered from an international, national, regional and site-specific perspective.

5.2 Need and Desirability from an International Perspective

The need and desirability of McTaggart 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 renewable energy in the global energy mix.	7.2.1 Renewable energy share in the total final energy consumption.
7.3 By 2030, double the global rate of improvement in energy efficiency.	7.3.1 Energy intensity measured in terms of primary energy and GDP.
7.A By 2030, enhance international cooperation to	7.A.1 Mobilised amount of United States dollars per year

Targets	Indicators
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.	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 McTaggarts PV3 would contribute positively towards Goal 7 of the SDGs through the following means:

- » By generating up to 75MW 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 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 is not a consumptive technology and 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

5.3.1 Policy and Planning

McTaggarts PV3 is proposed in specific response to a National Government initiative, the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. 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 McTaggarts PV3 from a national perspective, can largely be assimilated from the project's alignment with national government policies, plans, and programmes which have relevance to energy planning and production (as discussed in detail in **Chapter 4**). The following key plans have been developed by 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 abovementioned energy plans have been extensively researched and are updated on an ongoing 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 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 IRP for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. The IRP 2010 - 2030 includes 9.6GW of nuclear, 6.25GW of coal, **17.8GW of renewables**, and approximately 8.9GW of other generation sources such as hydro, and gas in addition to all existing and committed power plants.

On 27 August 2018, the then Minister of Energy published a draft IRP which has been issued for public comment. The public participation process has resulted in the issue of the IRP 2019 which is an update to

the energy forecast of the country 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** under the REIPP Programme has been procured with **3 876MW** being operational and made available to the grid;
- » 1 005MW has been commissioned by IPPs from the two (2) Open Cycle Gas Turbines (OCGT) peaking plants; and
- » Under the Eskom Build Programme, 1 332MW has been commissioned from the Ingula Pump Storage Project in Kwa-Zulu Natal, 1 588MW and 800MW from the Medupi and Kusile power stations, whereas 100MW has also been commissioned from the Sere Wind Farm.

In line with government policy to reduce greenhouse gas (GHG) emissions, the IRP uses the moderate decline constraint for GHG emissions. Although, this is subject to change following recent correspondence received from the DEA indicating that carbon budget methodology must be used instead of emissions decline constraints, the consideration of GHG emissions in the determination of the energy generation mix indicates government's commitment to international obligations under the Paris Agreement.

In response to the 2010 IRP, the DoE initiated a number of IPP Procurement Programmes to secure electricity generated by a range of resources from the private sector (i.e. from 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 DoE and a Power Purchase Agreement (PPA) with Eskom as the buyer. Provision has been made for new additional capacities by the 2019 IRP (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 & di	Gas & Diesel	3 000MW	3 000MW
Other (Distributed Generation, CoGen, Biomass, Landfill)	Other (Distributed Generation, CoGen, Biomass, Landfill)	4 000MW	4 000MW

Renewable resources are valuable in contributing towards electricity generation and diversifying South Africa's electricity mix, while contributing towards South Africa's response to Climate Change. Under the REIPPP Programme, the DoE 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 2 291.83MW of PV generated electricity has been awarded to preferred bidders across four (4) rounds of bidding to date, with 2 433.17 MW still remaining to be allocated in subsequent bidding rounds. Preferred bidders identified under any IPP Procurement Programme, including the REIPPP Programme, 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.

The need for new power generation from 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 McTaggart 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).

McTaggart 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, McTaggart 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).

5.3.2 Renewable Energy Development Zones (REDZ)

The DEA has committed to contribute to the implementation of the NDP, the National Infrastructure Plan (NIP) and the undertaking of Strategic Environmental Assessments (SEAs) to identify adaptive processes that streamline the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment.

The solar photovoltaic (PV) and wind SEA was accordingly commissioned by the DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large-scale solar PV and wind energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZ).

In the Statement on Cabinet Meeting of 17 February 2016, cabinet approved the gazetting of the REDZ. The procedure to be followed in applying for environmental authorisation for a large-scale project in a REDZ was formally gazetted on 16 February 2018 (in GN R113 and GN R114). The aim of the zones is to streamline the regulatory process, identifying geographical areas where wind and solar PV technologies can be incentivised and where intense grid expansion can be directed. These REDZ will ensure a transition to a low carbon economy, accelerating infrastructure development and contributing to a more coherent and predictable regulatory framework.

As illustrated in **Figure 5.1**, McTaggart PV3 falls within the Upington REDZ, which was selected by the DEA as an area highly suitable for solar energy facilities given a range of factors considered, including environmental sensitivities. This alignment with the REDZ area provides further support for the selection of the specific site chosen for this project.

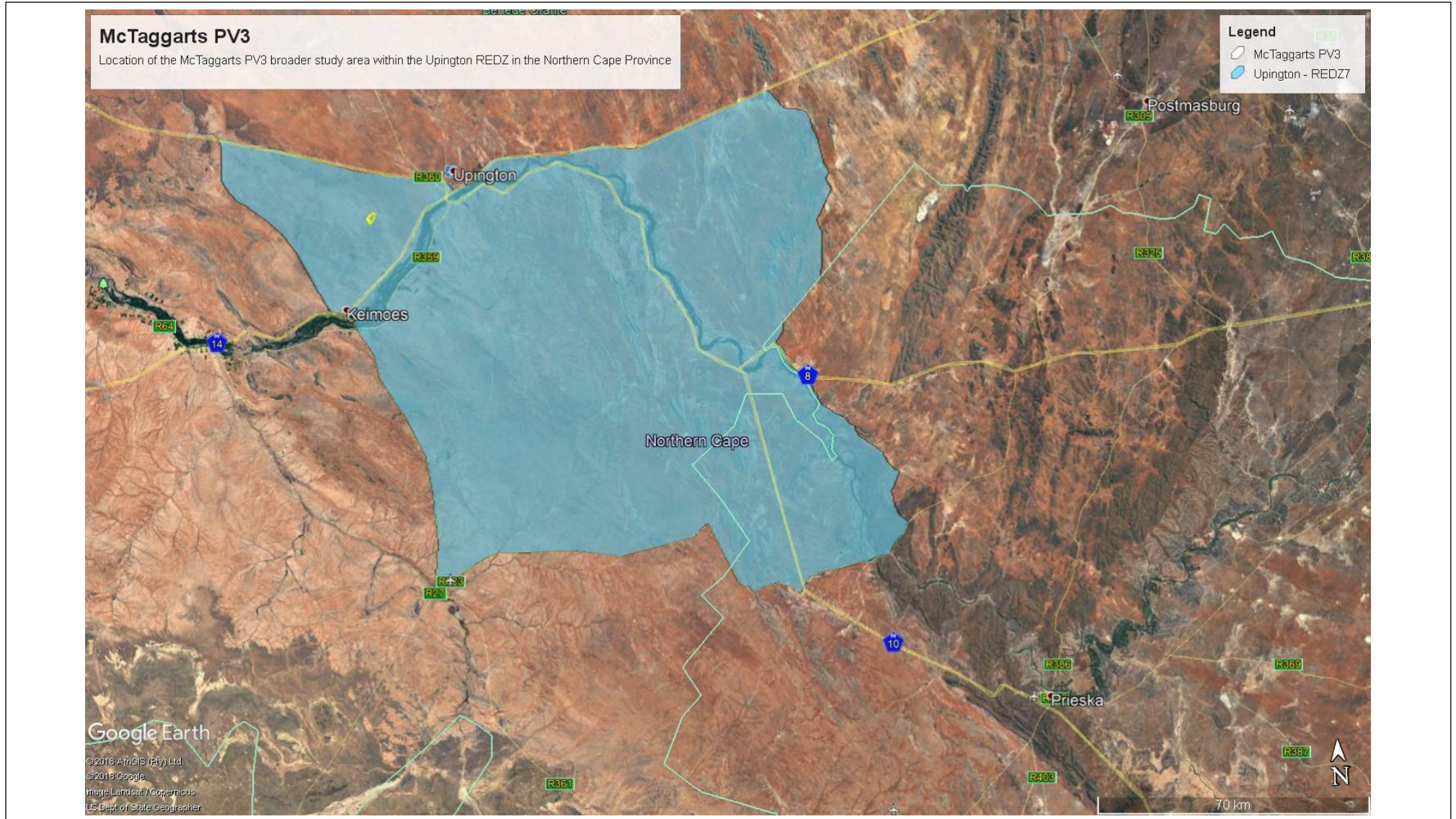


Figure 5.1: McTaggarts PV3 is located within the north-western corner of the Upington REDZ area (zone 7), known as the Upington REDZ.

From a planning perspective, the proposed grid connection solution²² (i.e. the proposed 132kV overhead power line and collector substations) is also considered to be appropriately located within the Northern corridor of the Strategic Transmission Corridors (refer to **Figure 5.2**).

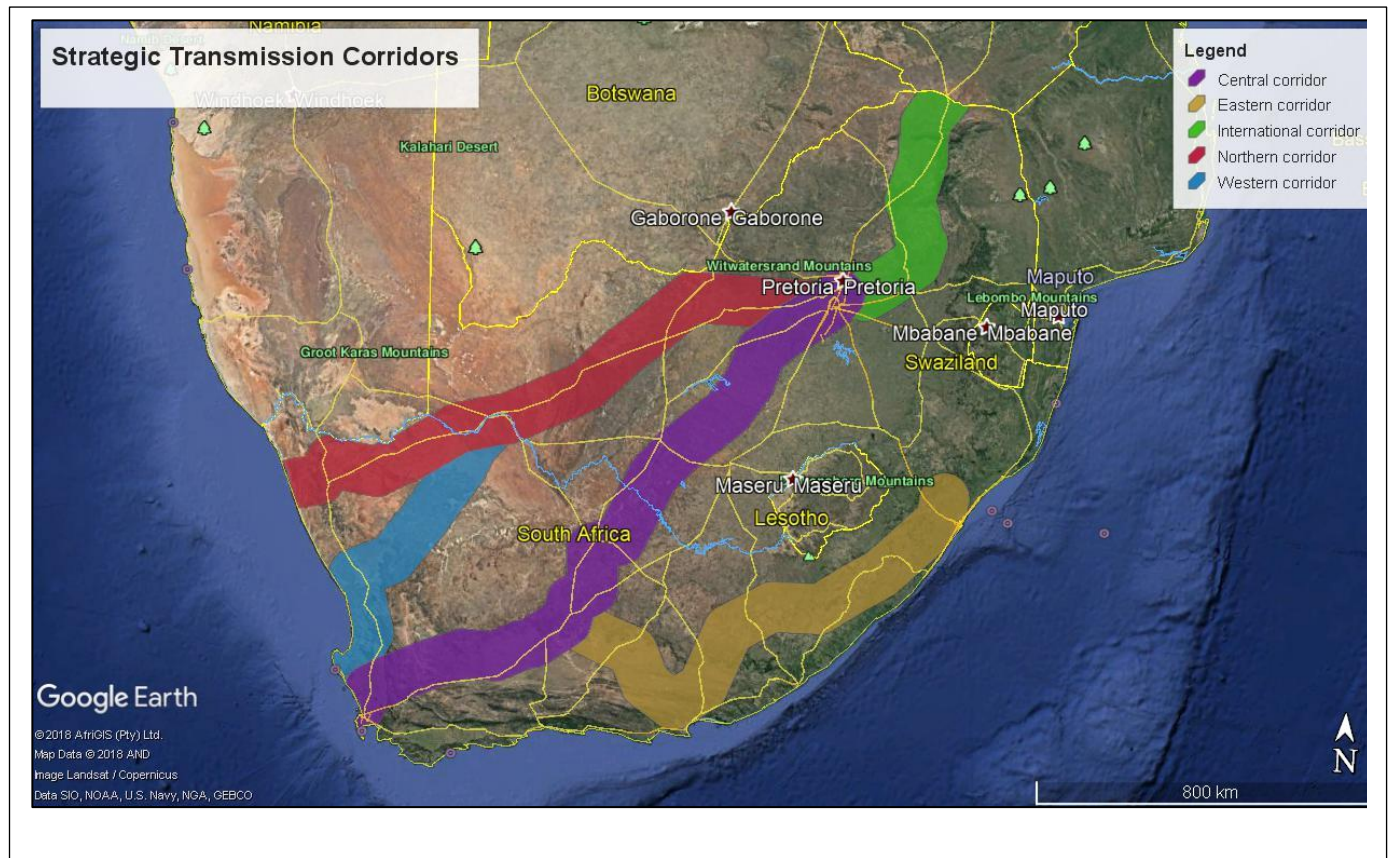


Figure 5.2: Strategic Power Corridors identified as the optimal locations where power infrastructure expansion is needed to enable the balancing of future demand and supply requirements, while minimising negative impacts to the environment.

5.4 Need and Desirability of the project from a Regional Perspective

South Africa's electricity generation mix has historically been dominated by coal. This can be attributed to the fact that South Africa has abundant coal deposits, which are relatively shallow with thick seams, and are therefore easy and comparatively cost effective to mine. In 2016, South Africa had a total generation capacity of 237 006GWh. Approximately 85.7% (equivalent to 203 054GWh) of this figure was generated by coal (predominantly located in Mpumalanga and Limpopo), and only 0.9% (equivalent to 2 151GWh) was generated by solar (refer to **Figure 5.3**).

²² The grid connection solution to connect Klip Punt PV1 to the Uppington MTS will be assessed within a separate BA process.

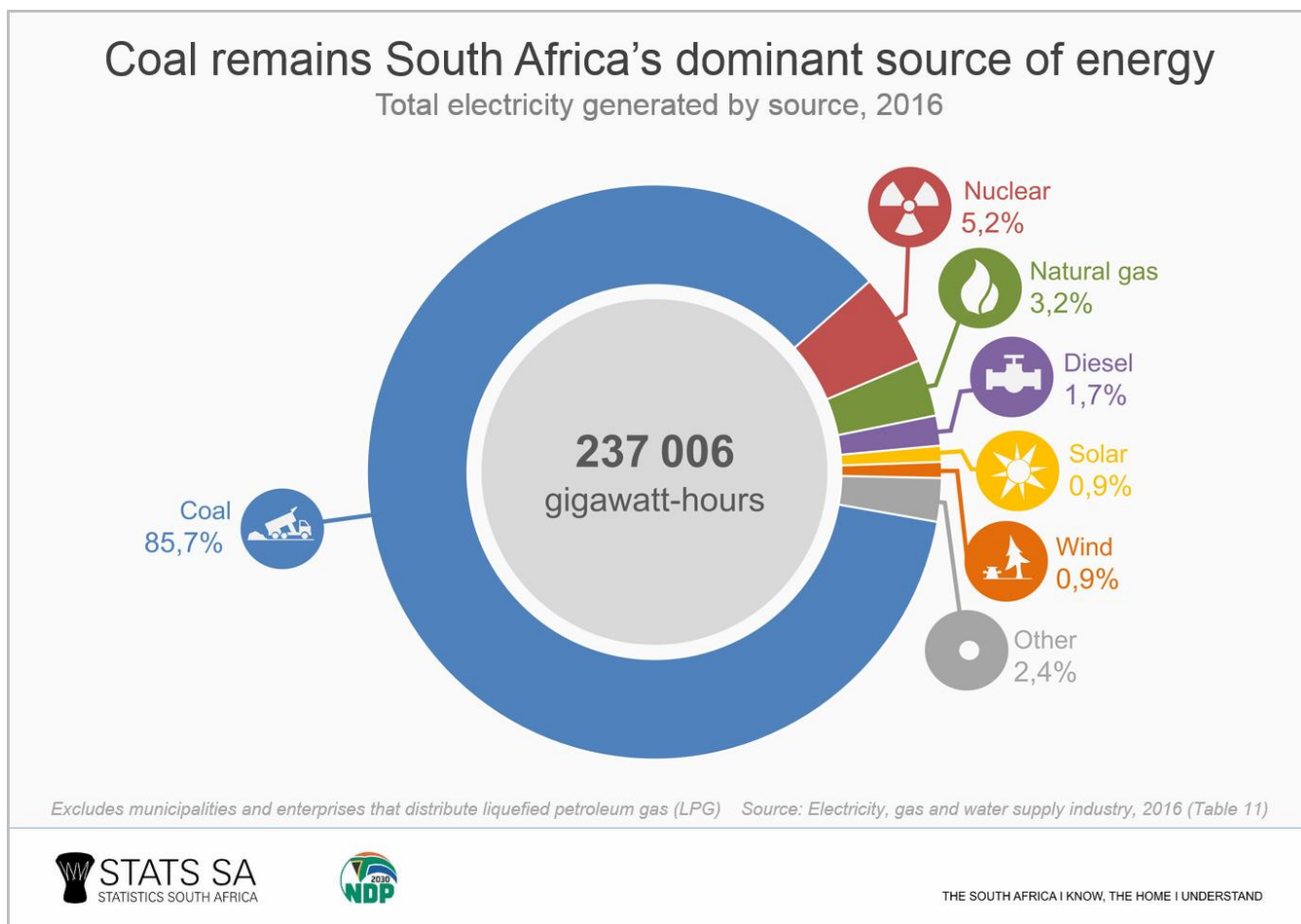


Figure 5.3: Overview of South Africa's electricity generation by source in 2016 (Source: StatsSA 2016 Electricity, gas and water supply industry).

Whereas the majority of South Africa's electricity generation infrastructure is currently located within Mpumalanga Province 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 broader study area within the Northern Cape is therefore considered to support the Province/Region's generation targets.

The Upington area has been earmarked as a hub for the development of solar energy projects due to the viability of the solar resource for the area. This is further supported by the Upington REDZ, which was selected by the DEA as an area highly suitable for the development of large-scale solar energy facilities. This alignment of the McTaggart PV3 site with the REDZ area provides further support for the selection of the specific site chosen for this project.

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 2264 kWh/m²/annum, equivalent to the highest GHI values in the country (refer to **Figure 5.4**).

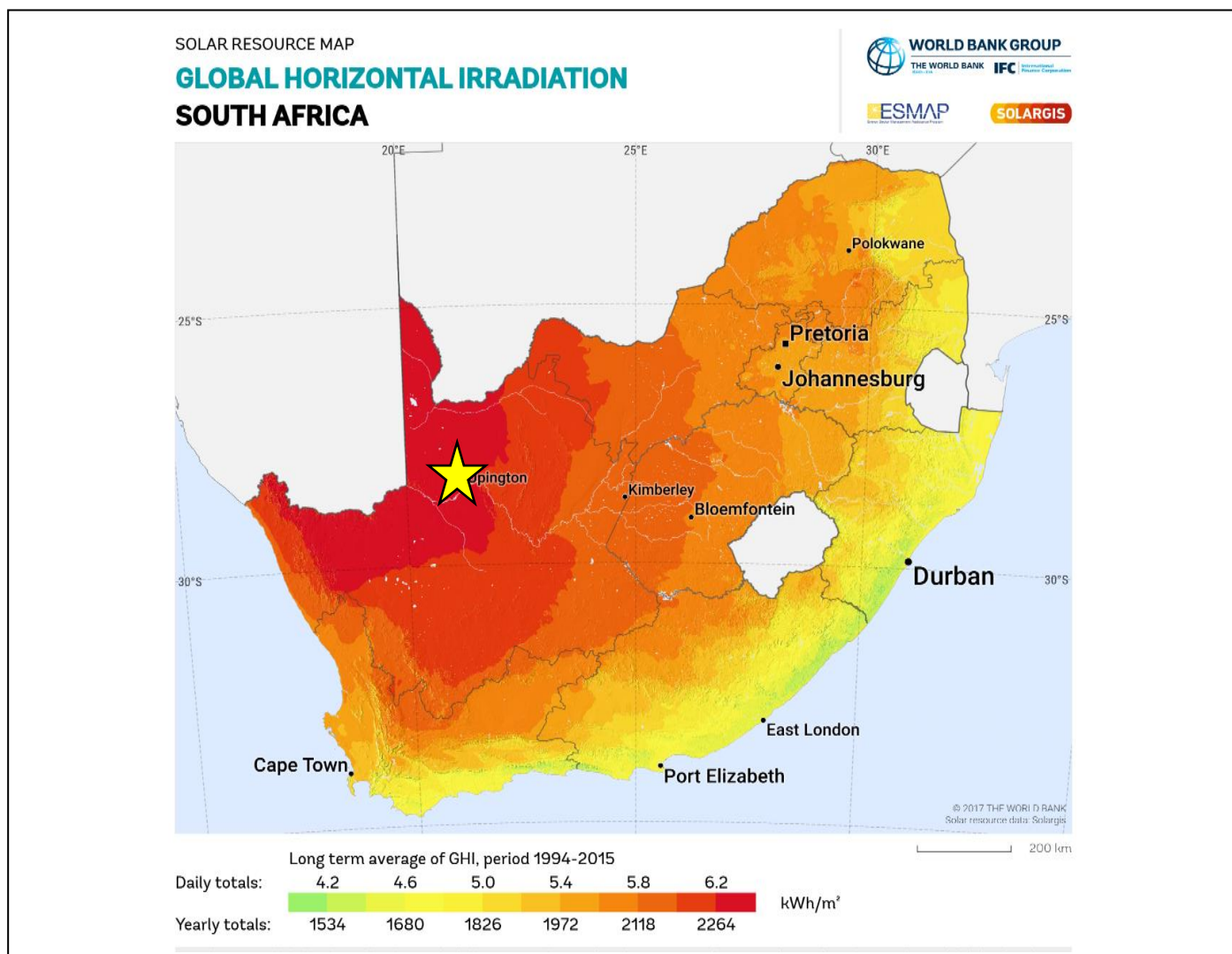


Figure 5.4: Solar irradiation map for South Africa, with the position of McTaggarts PV3 shown by the yellow star. (Source: World Bank Groups Global Solar Atlas).

5.5 Receptiveness of the proposed development area for the establishment of McTaggarts PV3

The placement of a solar PV facility is strongly dependent on several factors including climatic conditions (solar radiation levels), topography, the location of the site, and in particular the location in a planned 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 broader study area has 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 the broader study area is in the region of approximately 2278kWh/m²/annum.
- » **Geographic location:** The broader study and development area are located within the Upington REDZ which is a node identified by National Government for the development of renewable energy projects, with the following solar energy facilities located in close proximity to the development area:

the operational Khi Solar One CSP facility and the currently under construction Sirius One, Dyasons Klip 1 and Dyasons Klip 2 solar PV projects. The development area is also adjacent to an existing cluster or node of proposed solar PV developments, which compliments existing and future land use activities in the Upington area and is in line with the vision of National Government through the promulgation of the REDZ areas.

- » **Topography:** The broader study area consists of extensive to irregular plains on a slightly sloping plateau sparsely vegetated with an average slope of between 0% and 3%. The development area of the project is situated between elevations 865m and 874m above sea level, with an average elevation of 869m. This area generally has a gradual south facing slope (1.3%).
- » **Site extent:** The affected properties are approximately 2 904.7665ha in extent, which is sufficient for the installation of a facility with a contracted capacity of up to 75MW and allowing for avoidance of environmental site sensitivities. The development footprint of the facility would occupy an area of ~210ha, which is less than two thirds of the full extent of the affected properties (an area of 2 209.0189ha).
- » **Site access:** Access to the broader study and development area is provided via the existing Lutzputs gravel road (D3237) running from the N14 and towards the N10 in a north westerly direction. The N14 links the town of Upington with other major towns in the Province, such as Keimoes, Kakamas and Springbok.
- » **Grid access:** A key factor in the siting of any solar PV project is that the project must have a viable grid connection. The Upington MTS is located approximately 10.3km south-east of the development area. In terms of Eskom's 2018 – 2027 Transmission Development Plan (TDP), the document currently stipulates the following grid rollouts for this substation which are yet to be constructed:
 - » 2 x Upington - Aries 400kV lines
 - » Upington - Niewehoop 400kV line
 - » Upington - Ferrum 400kV line

Existing grid infrastructure (i.e. power lines and substations) within close proximity of McTaggarts PV3 provide an opportunity for the project to connect to the national grid with minimal new linear infrastructure (i.e. of less than 15km) required to be developed. The grid connection point for McTaggarts PV3 will be the existing Upington MTS. In order to connect the project to the national grid at this point, a grid connection solution comprising a collector substation and a new 132kV overhead power line will be required. The principle to minimise associated infrastructure and the resulting impacts is also supported.

- » **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 land suitability and current land use activities also need to be considered in terms of the need and desirability of a development within the area proposed. The broader study area of the project is currently used for livestock grazing and renewable energy generation. The greater Upington area is known as an agricultural hub in the Province, however, certain areas have been severely affected and limited by the prevailing semi-arid to arid climatic conditions in the Province. Agricultural activities undertaken in the Upington area include dry fruit production (i.e. raisins) and wine farms and are

restricted to the banks of the Orange River. The broader study area and development area identified for the development of McTaggarts PV3 are located too far away from the banks of the Orange River in order to derive benefit from the water resources and therefore grazing is the preferred land use. The current grazing activities will not be affected by the development of McTaggarts PV3 as the grazing can continue in tandem with the operation of the solar PV facility. Therefore, considering the current agricultural activities undertaken in the broader study area and the development area, the development of the solar PV facility is considered to be suitable and will not be in contradiction to these activities. The proposed development is desirable in terms of the agricultural activities being undertaken.

In addition, other land use activities within the vicinity of the broader study area include renewable energy generation, particularly that of solar energy through the use of solar irradiation as a fuel resource. The following large-scale solar PV and CSP renewable energy projects are approved and /or under construction, with one already operational (i.e. Khi Solar One).

Project Name	DEA Reference	Project Status
Kai !Garib CSP ²³	14/12/16/3/3/2/656	Approved
Khi Solar One	12/12/20/1831	Operational
Sirius Solar PV Project One	14/12/16/3/3/2/469	Under construction
Sirius Solar PV Project Two	14/12/16/3/3/2/470	Approved
Dyasons Klip 1 (RF) (Pty) Ltd	14/12/16/3/3/2/538	Under Construction
Dyasons Klip 2 (RF) (Pty) Ltd	14/12/16/3/3/2/538/1	Under Construction
RE Capital SC (Pty) Ltd	14/12/16/3/3/2/538/2	Approved
Dyasons Klip Solar Energy Facility 1 (Pty) Ltd	14/12/16/3/3/2/705	Approved
Rooipunt CSP	14/12/16/3/3/1/427	Approved

The approval, construction and operation of the above listed facilities provides in indication of the suitability and desirability of power generation through the use of solar power within the Upington area, as well as the surrounding areas of the broader study area.

From a land suitability perspective, sites that facilitate easy construction conditions, which include a relatively flat topography and the lack of major outcrops are predominantly preferred for development of solar PV facilities. The development area is flat, with an average slope of 0.3% and supports the desirability of the proposed development within the development area.

- » **Agricultural potential:** The unfavourable climate of the Kalahari greatly reduces the agricultural potential of the Upington area and other surrounding towns, i.e. Keimoes. The area is known as an agricultural hub; however, the broader study area is located too far away from the Orange River and its fertile banks to ever be considered for high intensity grazing and/or cultivation practices. The

²³ Previously called the Upington Solar Thermal Plant Two

potential agricultural capability of the broader study area is largely unsuitable for cultivation, based on the natural resources present, including the following limiting factors:

- * Low annual rainfall, high evaporation and extreme temperatures which restrict dry land cultivation;
 - * The very shallow soil depth with its limited water holding capacity restricts root development; and
 - * Sparse land cover with large bare areas and poor grasses, which also lead to soil erosion as a result of sheet wash.
- » **Access to Road Infrastructure:** The proximity of the broader study area to the N14 national road 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 broader study area was a key factor in determining the viability of McTaggarts PV3, particularly taking transportation costs (direct and indirect) into consideration and the impact of this development on the project economics and the ability to submit a competitive bid under the DoE's REIPPP Programme.
- » **Landowner support:** The selection of a site where the landowner is supportive of the development of a renewable energy facility is essential for ensuring the success of the project. The affected properties, Portion 12 of the Farm Klip Punt 452 and Portion 3 of the Farm McTaggarts Camp 453, are currently owned by Khi CSP South Africa (Pty) Ltd who purchased the land for the development of the Khi Solar One. McTaggarts PV3 (Pty) Ltd, the proponent for this application, has entered into a notarial lease agreement with the landowner Khi CSP South Africa (Pty) Ltd. The landowner is therefore in favour of the development and does not view the establishment of the solar PV facility as a conflict with the current land use practices.

Taking into consideration the solar resource, grid access, land suitability, agricultural potential, landowner support, access to road infrastructure, the current land use of the broader study area and development area, in conjunction with other large-scale solar PV and CSP projects that have been authorised within the vicinity of the broader study area, the development of McTaggarts 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 McTaggarts PV3 within the broader study area and development area is considered as a need for further development of existing activities and desirable considering the characteristics of the area.

5.6 Benefits of Renewable Energy and the Need and Desirability

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

Socio-economic upliftment of local communities: McTaggarts 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 municipalities 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 Energy, 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.

McTaggart PV3 also has the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPP Programme, the project will commit benefits to the local community, in the form of job creation, localisation, and community ownership. In accordance with the DoE's bidding requirements of the REIPPP Programme, 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 projects²⁴.

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

²⁴ (http://ntww1.csir.co.za/plsql/ptl0002/PTL0002_PGE157_MEDIA_REL?MEDIA_RELEASE_NO=7526896)

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

Exploitation of significant renewable energy resource: At present, valuable renewable resources including biomass by-products, solar radiation 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 excellent renewable energy resources and competitive procurement processes, both wind power and solar PV power have now been proven as cheaper forms of energy generation in South Africa than coal power. They offer excellent value for money to the economy and citizens of South Africa while benefitting society as a whole through the development of clean energy. This was supported by the Draft IRP 2018 released for comment which followed the least cost option.

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 radiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of GHG emissions. South Africa is estimated to currently be responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. Since its inception, the REIPPP Programme has achieved carbon emission reductions²⁵ of 25.3 million tonnes of CO₂ (IPP Office, March 2018). The development of McTaggart PV3, and the associated electricity generated as a result of the facility, will result in considerable savings on tons of CO₂ 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 the Kyoto Protocol, 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. By the end of March 2018, the REIPPP Programme had created 35 702 job years (equivalent of a full-time employment opportunity for one person for one year) for South African citizens including people from communities local to IPP operations (IPP Office, March 2018).

²⁵ 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 CO₂/MWh.

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.

CHAPTER 6: APPROACH TO UNDERTAKING THE BASIC ASSESSMENT PROCESS

In terms of the EIA Regulations of December 2014 (as amended in April 2017) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of McTaggart PV3 is a listed activity requiring environmental authorisation. In terms of GN R114 of February 2018, the application for environmental authorisation is required to be supported by a BA process based on the location of the larger study area and the development area within the Upington REDZ.

The BA process aims at identifying and describing potential environmental issues associated with the development of the proposed solar PV facility and the associated infrastructure. In order to ensure that a comprehensive assessment is provided to the competent authority and I&APs regarding the impacts of the facility, detailed independent specialist studies were undertaken as part of the BA process. In addition, a comprehensive consultation process was conducted, and included I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders. This chapter serves to outline the process that was followed during the BA process.

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

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

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for.	All listed activities triggered as a result of the development of McTaggart PV3 have been included in section 6.2, Table 6.1 . The specific project activity relating to the relevant triggered listed activity has also been included in Table 6.1 .
3(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The details of the public participation process undertaken for McTaggart PV3 have been included and described in section 6.3.2.
3(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	Comments raised during the focus group meetings and public meeting during the 30-day public review period have been recorded and responded to in the Comments and Responses (C&R) Report (Appendix C8). The issues raised have also been considered and addressed as part of this BA Report. All comments raised during the 30-day review period of the BA Report and through on-going consultation with I&APs will be included as part of a C&R report (Appendix C8) to be submitted as part of the final BA Report to DEA (soon to be DEFF) for decision-making.
3(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	The methodology used to assess the significance of the impacts of McTaggart PV3 has been included in section 6.4.

(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.

The assumptions and limitations of the BA process being undertaken for McTaggart PV3 is included in section 6.5.

6.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to McTaggart PV3, as identified at this stage in the process, are described in more detail under the respective sub-headings.

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

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(5) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant EA. Due to the fact that McTaggart PV3 is a power generation project and therefore relates to the IRP 2010 – 2030, the National DEA (soon to be DEFF) has been determined as the Competent Authority in terms of GN R779 of 01 July 2016. The Provincial Northern Cape Department of Environment and Nature Conservation (NC DENC) is the Commenting Authority on the project.

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

The BA process being conducted for McTaggart PV3 is undertaken in accordance with Section 24(5) of the NEMA, which defines the procedure to be followed in applying for Environmental Authorisation, and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

As the proposed development is located within Zone 7 of the Renewable Energy Development Zones (REDZ) (also known as the Upington REDZ), one of the eight (8) designated REDZ areas, the EIA (Environmental Impact Assessment) process to be followed for McTaggart PV3 will be as per GN R114, as formally gazetted on 16 February 2018. McTaggart PV3 is now subject to a Basic Assessment process and not a full EIA process, as well as a shortened timeframe of 57 days for the processing of an application for environmental authorisation.

Table 6.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) that apply to McTaggart PV3, and for which an application for Environmental Authorisation has been submitted to DEA. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 6.1: Listed activities as per the EIA regulations that are triggered by McTaggarts PV3

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
GN R327, 08 December 2014 (as amended on 07 April 2017)	11(i)	<p>The development of facilities or infrastructure for the transmission and distribution of electricity -</p> <p>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.</p> <p><u>McTaggarts PV3 will require the construction and operation of a new on-site substation of either 22kV/132kV or 33kV/132kV to facilitate the connection of the facility to the national grid. The development area assessed for the siting of McTaggarts PV3 is located outside of an urban area.</u></p>
GN R327, 08 December 2014 (as amended on 07 April 2017)	12(ii)(a)(c)	<p>The development of</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square meters or more; where such development occurs</p> <p>(a) within a watercourse or</p> <p>(c) within 32 meters of a watercourse, measured from the edge of a watercourse.</p> <p><u>The development and operation of McTaggarts PV3 will require the establishment of solar PV panels and other associated infrastructure within an ephemeral watercourse and within 32m of ephemeral watercourses identified within the development area. The solar PV panels will have a total extent of 195ha.</u></p>
GN R327, 08 December 2014 (as amended on 07 April 2017)	14	<p>The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more but not exceeding 500 cubic meters.</p> <p><u>The development and operation of McTaggarts PV3 will require 80m³ of storage and handling for dangerous goods, which will include, oils and lubricants which will be required for the operation and maintenance of machinery and other industrial applications during the construction and operation phase of the proposed development</u></p>
GN R327, 08 December 2014 (as amended on 07 April 2017)	19	<p>The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse.</p> <p><u>The solar PV panel area for McTaggarts PV3 is located adjacent to a number of ephemeral watercourses. Therefore, during the construction phase, it is possible that up to 10m³ of rock may be removed from the watercourses in order to allow for the placement of PV mounting structures and access roads.</u></p>
GN R327, 08 December	28(ii)	Residential, mixed, retail, commercial, industrial, or institutional

<p>2014 (as amended on 07 April 2017)</p>		<p>developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.</p> <p><u>McTaggart PV3 (considered to be an industrial development) will be constructed and operated on land previously used for agricultural purposes, including mainly grazing. The land is currently not used for any agricultural activities and the development footprint considered for the establishment of McTaggart PV3 is 210ha in extent and is located outside an urban area.</u></p>
<p>GN R325, 08 December 2014 (as amended on 07 April 2017)</p>	<p>1</p>	<p>The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.</p> <p><u>McTaggart PV3 is a solar PV facility and will make use of solar energy as a renewable energy resource. The project will have a contracted capacity of up to 75MW.</u></p>
<p>GN R325, 08 December 2014 (as amended on 07 April 2017)</p>	<p>15</p>	<p>The clearance of an area of 20 hectares or more of indigenous vegetation.</p> <p><u>The project requires the clearance of an area up to 210ha (equivalent to the development footprint) of vegetation. The project is proposed on a property where the predominant land use is grazing; however, at present, the land is not used for any agricultural activities. The project would therefore result in the clearance of an area of indigenous vegetation greater than 20ha in extent.</u></p>

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

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e. the Regional Department of Human Settlements, Water and Sanitation²⁶). Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

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

²⁶ The Department of Water and Sanitation (DWS) is soon to be called the Department of Human Settlements, Water and Sanitation.

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. The development area considered for the establishment of McTaggarts PV3 is associated with the presence of ephemeral watercourses. Activities pertaining to the establishment of the solar PV facility might encroach on watercourses which may lead to an impediment and diversion of the flow of water in the watercourses.
	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. The development area considered for the establishment of McTaggarts PV3 is associated with the presence of ephemeral watercourses. Activities pertaining to the establishment of the solar PV facility might encroach on watercourses which may lead to the altering of the characteristics of the watercourses.

In the event that the flow of water in the ephemeral watercourses is affected and the bed, banks or course characteristics are altered, application would need to be made for a WUL in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GN R267), or a GA registered in accordance with the requirements of Revision of General Authorisation. The process of applying for a WUL or GA registration will only be completed once a positive EA has been received and the project selected as a Preferred Bidder. This is in 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 McTaggarts PV3, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).

6.3 Overview of the Basic Assessment Process for McTaggarts PV3

Key tasks undertaken for the BA included:

- » Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- » Submission of the completed Application for Environmental Authorisation to the competent authority (i.e. DEA) in terms of Regulations 5 and 6 of the EIA Regulations, 2014 (GNR 326), as amended.
- » Undertaking a public participation process in accordance with Chapter 6 of GNR326, and the Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (hereinafter referred to as "the Guidelines") in order to identify issues and concerns associated with the proposed project.
- » Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR326), as amended.
- » Preparation of a BA Report and EMPr in accordance with the requirements of Appendix 1 and Appendix 4 of GN R326.
- » 30-day public and authority review period of the BA report.
- » Compilation of a C&R report detailing the comments raised by I&APs, addressing these comments in detail and finalisation of the BA report.
- » Submission of a final BA report to the DEA for review and decision-making.

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

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

In terms of Government Notice 779 of 01 July 2016, the National Department of Environmental Affairs (DEA) is the competent authority for all projects related to the IRP. As the project is located within the Northern Cape Province, the Northern Cape Department of Environment and Nature Conservation (DENC) is the commenting authority. Consultation with the regulating authorities (i.e. DEA and DENC) as well as with all other relevant Organs of State will continue throughout the BA process. To date, this consultation has included the following:

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

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

An authority site visit was requested by the Competent Authority in order to confirm the findings of the BA Report submitted to the Department for comments and review on 13 November 2019. The site visit was undertaken on 3 December 2019 during which the location of the project was shown to the officials from the Department. The sensitive environmental features present within the development area for McTaggarts PV3 were discussed and visited as well as the results included in the BA Report. The following officials from the Department attended the site visit:

- » Zesipho Makhosayafana
- » Thulisile Nyalunga
- » Constance Musemburi

As part of the site visit, the Khunab Solar Grid Connection project was also discussed and the covered. This project is being assessed as part of a separate BA process and a BA Report will be submitted to the Department for review and comment.

6.3.2. Public Participation Process

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

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

During the BA process:

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

- » comment on the findings of the environmental assessments.

During the decision-making phase:

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

The public participation process therefore aims to ensure that:

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

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks are required to be undertaken:

- » Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; 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 BA Report for a 30-day review period.
- » Prepare a Comments and Responses (C&R) report which documents the comments received on the BA process and during the 30-day review period 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), the following summarises the key public participation activities conducted to date.

i. Stakeholder identification and Register of Interested and Affected Parties

42. A proponent or applicant must ensure the opening and maintenance of a register of I&APs and submit such a

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

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders are required to formally register their interest in the project. 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 McTaggart PV3

Organs of State
National Government Departments²⁷
Department of Environmental Affairs
Department of Mineral Resources
Department of Energy
Department of Agriculture Forestry and Fisheries
Department of Water and Sanitation
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 (DENC)
Northern Cape Department of Roads and Public Works
Ngwao Boswa Kapa Bokone (NBKB)
Local Government Departments
ZF Mgcawu District Municipality

²⁷ These government departments are soon to be known as the Department of Environment, Forestry and Fisheries (DEFF), Department of Resources and Energy (DMRE), Department of Agriculture, Land Reform and Rural Development (DALRD) and the Department of Human Settlements, Water and Sanitation.

Dawid Kruiper Local Municipality

Kai !Garib Local Municipality

Commenting Stakeholders

BirdLife South Africa

Endangered Wildlife Trust (EWT)

SENTECH

Wildlife and Environment Society of South Africa (WESSA)

Landowners

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 names²⁸ of:

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

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

ii. Advertisements and Notifications

- 40.(2)(a) Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of –
- (i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and
 - (ii) Any alternative site.
- 40.(2)(b) Giving written notice, in any of the manners provided for in section 47D²⁹ of the Act, to –

²⁸ 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).

²⁹ Section 47D of NEMA pertains to the delivery of documents, and states that:

- (1) A notice or other document in terms of this Act or a specific environmental management Act may be issued to a person –
 - (a) By delivering it by hand;
 - (b) By sending it by registered mail –

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

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

- » Compilation of a background information document (BID) (refer to **Appendix C3**) providing technical and environmental details on the project and how to become involved in the BA process. The BID has been distributed on 09 October 2019 via email to identified stakeholders and I&APs. The BID is also available electronically on the Savannah Environmental website (<http://www.savannahsa.com/public-documents/energy-generation>).
- » Placement of site notices announcing the BA process at visible points along the boundary of the project site, in accordance with the requirements of the EIA Regulations on 16 October 2019. Photographs and the GPS co-ordinates of the site notices are contained in **Appendix C2**.

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

- » Placement of notices regarding the BA process were placed at the Upington Public Library and the Keimoes Library on 16 October 2019. Photographs and the GPS co-ordinates of the notices are contained in **Appendix C2**.
 - » The BID and BA process notification letters announcing the BA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/I&APs of the McTaggarts PV3, providing background information of the project and inviting I&APs to register on the project's database, were distributed via email on 9 October 2019. The evidence of the distribution of the process notification letters is contained in **Appendix C** of the BA Report.
 - » Placement of advertisement announcing the BA process and the availability of and inviting comment on the BA Report in Gemsbok Newspaper on 13 November 2019 at the commencement of the 30-day review period. This advert also included the details on the review period for the BA report and the location of where the report can be accessed. The details of the newspaper advert placement will be contained in **Appendix C2** of the final BA Report.
 - » The BA Report was made available for review by I&APs for a 30-day review period from 13 November 2019 to 13 December 2019. CD and hard copy versions of the BA Report were circulated to Organs of State via courier at the commencement of the review period. The BA Report was also made available on the Savannah Environmental website and hard copies of the report were placed at the Upington and Keimoes public libraries. The evidence of distribution of the BA Report is included in the Final BA Report.
- iii. Public Involvement and Consultation

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

Table 6.4: Public involvement for McTaggarts PV3

Activity	Date
Distribution of the process notification and stakeholder reply form announcing the BA process and inviting I&APs to register on the project database.	9 October 2019
Distribution of the BID	9 October 2019
Placement of site notices on-site and in public places.	16 October 2019
Distribution of notification letters announcing the availability of the BA Report for review for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the greater study area (including neighbouring landowners) and key stakeholder groups.	12 November 2019
Advertising of the availability of the BA Report for a 30-day review period in Gemsbok newspaper.	13 November 2019
30-day review period for the BA Report for comment.	13 November – 13 December 2019
Focus Group Meetings: <ul style="list-style-type: none"> » Affected Landowners; » Adjacent Landowners; » Authorities and Key Stakeholders (including organs of state, local municipality and community-based organisations) 	28 November 2019
Public Meeting <ul style="list-style-type: none"> » Kalksloot Community Hall, Druive Street, Olyvenhouts Drift 	14 November 2019

Settlement Agricultural Holdings 1080	
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs	Throughout BA process

The purpose of the abovementioned meetings was to engage with key stakeholders to ensure that key requirements/comments are noted and addressed as part of the BA process. Records of all consultation undertaken are included in **Appendix C**.

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

- 43.(1) A registered I&AP is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.
- (2) In order to give effect to section 24O of the Act, any State department that administers a law relating to a matter affecting the environment must be requested, subject to regulation 7(2), to comment within 30 days.
- 44.(1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.
- (2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to –
- (a) A lack of skills to read or write;
 - (b) Disability; or
 - (c) Any other disadvantage;
- Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database have been notified by means of a notification letter (e-mail and registered mail) of the release of the BA Report for a 30-day review period, invited to provide comment on the BA Report, and informed of the manner in which, and timeframe within which such comment must be made. The notification was distributed prior to commencement of the 30-day review period, on 12 November 2019. Where I&APs were not able to provide written comments, face to face consultation was undertaken through holding of a public meeting which provided the I&APs with a platform to verbally raise their concerns and comments on the proposed development.

v. Identification and Recording of Comments

Comments raised by I&APs over the duration of the BA process have been synthesised into a Comments and Responses (C&R) Report which is included in **Appendix C8** of the Final BA Report. The C&R Report includes all written comments received and responses to the comments from members of the BA process project team and the applicant (McTaggart PV3 (Pty) Ltd) raised during the 30-day review period of the BA Report.

Meeting minutes of the meetings conducted during the 30-day review period of the BA Report are included in **Appendix C6** of the Final BA Report.

Written comments on the BA Report were submitted by Organs of State including, the South Civil Aviation Authority (SACAA), National Department of Environmental Affairs: Biodiversity Directorate and the Competent Authority, i.e. the National Department of Environmental Affairs.

No written comments were submitted by I&APs on the BA Report during the 30-day review period. Verbal comments were however raised by I&APs during the Public Meeting held in Kalksloot near Upington on the 28th November 2019. These verbal comments were recorded and have been included as **Appendix C7** of the Final BA Report.

The table below provides a summary of the main issues raised by Organs of State and I&APs during the 30-day review period of the BA Report.

Summary of the main issues raised by the Organ of State and Interested and Affected Parties	Summary of response from the EAP
<p><u>The SACAA requested that a KML file reflecting the footprint of the proposed development site including the proposed overhead electric power line route that will evacuate the generated power to the national grid.</u></p>	<p><u>The SACAA procedure and process link was forwarded to the applicant for their attention. The KML file was submitted via email to Lizell Stroh from SACAA on 19 November 2019. The proof of submission is included in Appendix C4 and C6 of the Final BA Report. Furthermore, the applicant submitted an application to the SACAA on 3 December 2019.</u></p>
<p><u>The National Department of Environmental Affairs (DEA) requested that the notarial lease agreement/landowner consent letter be included in the Final BA Report.</u></p>	<p><u>A landowner consent letter from the landowner of the property affected by the development of McTaggart PV3 is included in Appendix 3 of the updated Application</u></p>

	<p>Form submitted with Final BA Report.</p>
<p>The National Department of Environmental Affairs (DEA) requested that specialist declarations that were not submitted with the BA Report be submitted to the Department with the Final BA Report.</p>	<p>The specialist declarations and curricula vitae of specialists that prepared the various specialist reports are included in Appendix N of the Final BA Report. The details of the specialists who prepared the reports are included in Table 1.3 of Chapter 1, as well as, Appendix F of the Final BA Report.</p>
<p>The DEA requested that all relevant listed activities applied for must be specific and be linked to the development activity and infrastructure as described in the project description of the BA Report.</p>	<p>All relevant listed activities for McTaggarts PV3 have been described in detail and are specific to the infrastructure required for the development and are included in the updated Application Form for Environmental Authorisation submitted with the Final BA Report to the Department.</p>
<p>The DEA requested that a Comments and Responses Report and a copy of the</p>	<p>A Comments and Responses Report including responses from</p>

newspaper advertisement be included in the Final BA Report.

the EAP and the Applicant is included as **Appendix C8** in the Final BA Report. Furthermore, the tear sheet of the newspaper advertisement announcing the availability of the BA Report and inviting members of the public in the Northern Cape, particularly Upington to a Public Meeting has been included in **Appendix C2** of the Final BA Report.

The DEA further requested that an undertaking under oath and affirmation from the EAP be included in the Final BA Report.

Appendix N of the Final BA Report includes an oath and affirmation from Jo-Anne Thomas who is the EAP for the McTaggarts PV3 development.

The DEA's Biodiversity Directorate indicated that a pre-construction walk-through must be undertaken for the final development footprint in order to locate and identify and species of conservation concern that can be transformed.

The EMPr (**Appendix M**) in Objective 2 of the Design Phase includes a condition for the undertaking of a walk-through survey of the development footprint in order to locate species of conservation concern.

The Directorate requested that a Site Rehabilitation Plan must be developed, and all cleared areas be rehabilitated with indigenous perennial shrubs and grasses from the local area. The Directorate further requested that a search and rescue exercise must be undertaken for species of conservation concern identified within the footprint of the facility and that their relocation needs to be undertaken by a suitably qualified professional.

The EMPr in Objective 7 of the Construction Phase includes a condition for the Contractor to implement a comprehensive rehabilitation plan. Furthermore, Objective 1 of the Rehabilitation Phase (also included in the EMPr) includes a condition for the implementation of a revegetation and rehabilitation plan which will include the use of indigenous vegetation during the rehabilitation phase of the project.

The EMPr in Objective 2 of the Design Phase includes a condition which requires the applicant to appoint a suitably qualified professional for the undertaking of a search and rescue operation for the identified species of conservation concern.

The Directorate also

The EMPr in

indicated that an Alien Invasive Species Eradication Plan must be implemented and all alien plant species within the development footprint must be regularly monitored. Furthermore, the Directorate indicated that best practice methods for the clearance of alien invasive plant species needs to be conducted using best practice methods.

Objective 2 of the Design and Planning Phase includes a condition for the development and implementation of an invasive alien plants eradication control plan. A management plan for alien invasive plant species is included in **Appendix C** of the EMP. In addition, Objective 6 of the Construction Phase requires the Contractor's EO to monitor cleared areas on an on-going basis and also makes provision for the undertaking of an annual audit of the development footprint and immediate surroundings by suitably qualified botanist.

Pieter Ackermann (Chief Landscape Architect at DWS) indicated that water use authorisation for the project since the development would be occurring within a regulated area.

The EAP determined that the McTaggarts PV3 development falls within the Lower Orange WMA (WMA 14) and the relevant commenting official was identified and

	<p>issued with a copy of the BA Report for review and comment; however, to date no further comments were issued.</p>
<p>SAHRA indicated that it will only be providing comments on the project on 24 January 2020 as the report was only made available on the SAHRIS platform on 3 December 2019.</p>	<p>The project team acknowledged the comment; however, technical challenges were experienced in uploading the BA Report on SAHRIS prior to the commencement of the review and comment period, as their system was offline. Therefore, the comments from SAHRA will be submitted to the Department as late comments following the submission of the Final BA Report.</p>
<p>Francois Theron (Blue Dot Properties 567 (Pty) Ltd Manager) requested for the BID before he could submit comments on the project and the Social Impact Assessment. In principle, he indicated that he had no issues with the project.</p>	<p>The BID and BA process notification letter were submitted via email correspondence on 9 October 2019 (refer to Appendix C5). No comments were subsequently received.</p>
<p>Adjacent landowners Botha du Toit and</p>	<p>The EAP acknowledged</p>

Willem Louw indicated that the landowners did not have any objections to the project or any comments thereto.

6.4 Assessment of Issues Identified through the BA Process

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

Table 6.5: Specialist consultants appointed to evaluate the potential impacts associated with McTaggart PV3

Specialist Name	Specialist Company	Specialist Area of Expertise	Appendices
Simon Todd	3Foxes Biodiversity Consulting (Pty) Ltd	Ecology Impact Assessment	Appendix D
Eric Hermann	3Foxes Biodiversity Consulting (Pty) Ltd	Avifauna Impact Assessment	Appendix E
Brian Colloty	EnviroSci (Pty) Ltd	Freshwater Impact Assessment	Appendix F
Marinè Pienaar	TerraAfrica (Pty) Ltd	Soils and Agricultural Potential Impact Assessment	Appendix F
Jenna Lavin	CTS Heritage (Pty) Ltd	Heritage Impact Assessment (including archaeology and palaeontology)	Appendix G
Jon Marshall	Environmental Planning and Design (Pty) Ltd	Visual Impact Assessment	Appendix H
Lisa Opperman and Neville Bews	Savannah Environmental (Pty) Ltd and Neville Bews and Associates	Social Impact Assessment	Appendix I
Jeandre Thompson	SRK	Stormwater Management Plan	Appendix J
Iris Wink	JG Afrika	Traffic Impact Assessment	Appendix K

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of McTaggart PV3. Issues were assessed in terms of the following criteria:

- » The **nature**, a description of what causes the effect, what will be affected, and how it will be affected;
- » The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high);
- » The **duration**, wherein it is indicated whether:
 - * The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - * The lifetime of the impact will be of a short duration (2–5 years) - assigned a score of 2;
 - * Medium-term (5–15 years) – assigned a score of 3;
 - * Long term (> 15 years) - assigned a score of 4;
 - * Permanent - assigned a score of 5.

- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - * 0 is small and will have no effect on the environment;
 - * 2 is minor and will not result in an impact on processes;
 - * 4 is low and will cause a slight impact on processes;
 - * 6 is moderate and will result in processes continuing but in a modified way;
 - * 8 is high (processes are altered to the extent that they temporarily cease);
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - * Assigned a score of 3 is probable (distinct possibility);
 - * Assigned a score of 4 is highly probable (most likely);
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- » The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- » The **status**, which is described as either positive, negative or neutral;
- » The degree to which the impact can be reversed;
- » The degree to which the impact may cause irreplaceable loss of resources;
- » The degree to which the impact can be mitigated.

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

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

S = Significance weighting.

E = Extent.

D = Duration.

M = Magnitude.

P = Probability.

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

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

As the proponent has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations, 2014 (as amended)), the mitigation of significant impacts is discussed. An assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. An Environmental Management Programme (EMPr) is included as **Appendix M**.

6.5 Assumptions and Limitations of the BA Process

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

- » All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- » It is assumed that the development area and development footprint for the solar PV facility identified by the developer represents a technically suitable site for the establishment of McTaggarts PV3 which is based on the design undertaken by technical consultants for the project.
- » This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

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

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

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

- » National Environmental Management Act (Act No. 107 of 1998);
- » EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended in GN R326 in Government Gazette No 40772 of April 2017);
- » Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations; and
- » International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

6.6.1 Applicable National, Provincial and local Legislation, Policies and/or Guidelines

Table 6.6 provides an outline of the legislative permitting requirements applicable to McTaggarts PV3 as identified at this stage in the project process.

Table 6.6: Applicable Legislation, Policies and/or Guidelines associated with the development of McTaggart PV3

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	<p>In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that:</p> <p><i>“Everyone has the right –</i></p> <ul style="list-style-type: none"> » <i>To an environment that is not harmful to their health or well-being, and</i> » <i>To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:</i> <ul style="list-style-type: none"> * <i>Prevent pollution and ecological degradation,</i> * <i>Promote conservation, and</i> * <i>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</i> 	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the “right to an environment clause” includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	<p>The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326).</p> <p>In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>Considering the location of the project site within the Upington Renewable Energy Development Zone (REDZ 7) and the requirements GNR114 of 16 February 2018, a Basic Assessment Process is required to be undertaken for the</p>	DEA– 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 BA process currently underway for the project. The BA process will culminate in the submission of a final BA Report to the competent authority in support of the application for EA.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management Act (No 107 of 1998) (NEMA)</p>	<p>proposed project. All relevant listing notices for the project (GN R327, GN R325 and GN R324) will be applied for</p> <p>In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.</p> <p>In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	<p>DEA Northern Cape DENC</p>	<p>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.</p>
<p>Environment Conservation Act (No. 73 of 1989) (ECA)</p>	<p>The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces.</p> <p>The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties.</p> <p>In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).</p>	<p>DEA Northern Cape DENC</p> <p>Kai !Garib Local Municipality</p>	<p>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.</p>
<p>National Water Act (No. 36 of 1956)</p>	<p>A water use listed under Section 21 of the NWA must be</p>	<p>Regional Department of</p>	<p>Ephemeral watercourses are present within</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
1998) (NWA)	<p>licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under a GA, or if a responsible authority waives the need for a licence.</p> <p>Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.</p> <p>Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)).</p> <p>Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).</p>	Water and Sanitation	<p>the development area considered for the establishment of McTaggart PV3.</p> <p>Where the development activities impede or divert the flow of water in a watercourse, or alter the bed, banks, course or characteristics of a watercourse, Section 21(c) and 21(i) of the NWA (Act 36 of 1998) would be triggered and the project proponent would need to apply for a WUL or register a GA with the DWS.</p>
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	<p>In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.</p> <p>Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for</p>	Department of Mineral Resources (DMR)	<p>Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.</p> <p>In terms of Section 53 of the MPRDA approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	approval in the prescribed manner.		sterilise a mineral resource that might occur on site.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	<p>The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas.</p> <p>In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme.</p> <p>Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.</p>	Northern Cape DENC / ZF Mgcawu District Municipality	In the event that the project results in the generation of excessive levels of dust the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed. However, with mitigation measures implemented, McTaggart PV3 is not anticipated to result in significant dust generation.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	<p>Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance.</p> <p>Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites.</p> <p>Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.</p> <p>Section 38 of the NHRA lists activities which require</p>	South African Heritage Resources Agency (SAHRA) Ngwao Boswa Kapa Bokone (NBKB)	<p>A full Heritage Impact Assessment (HIA) (with field work) has been undertaken as part of the BA process (refer to Appendix H of this BA Report). No sites of heritage significance were identified within the development footprint.</p> <p>Should a heritage resource be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone (NBKB) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). This will be</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.</p> <p>Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.</p>		<p>determined as part of the final walk through survey once the final location of the development footprint and its associated infrastructure within the development area has been determined.</p>
<p>National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)</p>	<p>Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process.</p> <p>Three government notices have been published in terms of Section 56(1) of NEM:BA as follows:</p> <ul style="list-style-type: none"> » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). <p>It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).</p>	<p>DEA Northern Cape DENC</p>	<p>Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species.</p> <p>Two (2) listed terrestrial mammals may occur within the development area; these include the Near-Threatened Brown Hyena and the Black Footed Cat. It is possible that both species may occur within the development area, however, it is even more likely that the Brown Hyena is present as this species is often purposefully persecuted in farming areas.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)</p>	<p>Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out.</p> <p>Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).</p>	<p>DEA Northern Cape DENC</p>	<p>The development area is associated with minor <i>Prosopis glandulosa</i> invasions particularly around watering points, but in general, there are a few invasive alien plant species present across most of the broader study area.</p> <p>The <i>Prosopis glandulosa</i> is a Category 3 Listed Invasive Species in the Northern Cape Province in terms of the NEMBA: Alien and Invasive Species List, 2016 (GN R864 of 2016).</p>
<p>Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)</p>	<p>Section 05 of CARA provides for the prohibition of the spreading of weeds.</p> <p>Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur.</p> <p>Regulation 15E of GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.</p>	<p>Department of Agriculture, Forestry and Fisheries (DAFF)</p>	<p>CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented.</p> <p>In terms of Regulation 15E (GN R1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods:</p> <ul style="list-style-type: none"> » 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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<p>accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation.</p> <ul style="list-style-type: none"> » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4. » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
<p>National Forests Act (No. 84 of 1998) (NFA)</p>	<p>According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734.</p> <p>The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".</p>	<p>Department of Agriculture, Forestry and Fisheries (DAFF)</p>	<p>A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development area for the submission of relevant permits to authorities prior to the disturbance of these individuals.</p> <p>The Ecological Impact Assessment undertaken as part of the BA Report included a site visit which allowed for the identification of any protected tree species which may require a license in terms of the NFA (No. 84 of 1998) within the development area (refer to Appendix D of this BA Report).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<p>Two (2) NFA-listed tree species occur within the development; these include the <i>Vachellia erioloba</i> and <i>Boscia albitrunca</i>. These species are associated mainly with the drainage lines traversing the development area. Only a limited population of these species will be impacted by the development of McTaggarts PV3. Therefore, permits are required from DAFF prior to site clearance during the construction phase.</p>
<p>National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)</p>	<p>Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it.</p> <p>Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection</p>	<p>DEA</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of McTaggarts PV3, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>Hazardous Substances Act (No. 15 of 1973) (HAS)</p>	<p>association, if any.</p> <p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <ul style="list-style-type: none"> » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>	<p>Department of Health (DoH)</p>	<p>It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the Department of Health (DoH).</p>
<p>National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)</p>	<p>The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. 	<p>DEA) – Hazardous Waste</p> <p>Northern Cape DENC – general waste</p>	<p>No waste listed activities are triggered by McTaggarts 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</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unfit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented. 		<p>NEM:WA will need to be considered in this regard.</p>
<p>National Road Traffic Act (No. 93 of 1996) (NRTA)</p>	<p>The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</p> <p>Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</p> <p>The general conditions, limitations, and escort requirements</p>	<p>South African National Roads Agency (SANRAL) – national roads</p> <p>Northern Cape Department of Transport, Safety and Liaison</p>	<p>An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation components may not meet specified dimensional limitations (height and width).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>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.</p>		
Provincial Policies / Legislation			
<p>Northern Cape Nature Conservation Act (Act No. 9 of 2009)</p>	<p>This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project:</p> <ul style="list-style-type: none"> » 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; <p>The Act provides lists of protected species</p>	<p>Northern Cape DENC</p>	<p>A collection/destruction permit must be obtained from Northern Cape Nature Conservation for the removal of any protected plant or animal species found on site.</p> <p>Species of conservation concern that may be present within the development area include, <i>Adenium oleifolium</i>, <i>Aloe claviflora</i> and <i>Hoodia gordonii</i>. None of these species were observed by the specialist during the field survey. However, should these species be confirmed within the development area during any phase of the proposed development, permits will be required from the Northern Cape Department of Nature Conservation and Environment.</p>

6.6.2 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 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 6.7** 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 0.7: 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 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 McTaggart PV3 broader study area, including the development area, has been classified as a Regime 2 site, as the area has been defined as a medium sensitive area in terms of the BirdLife South Africa Guidelines. Seasonal monitoring over two monitoring periods (that is, a five-day field survey in October 2018 and another four-day field survey in April 2019) have been completed and informed the findings of the Avifauna Impact Assessment.

6.6.3 The IFC EHS Guidelines

The IFC EHS Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). The following IFC EHS Guidelines have relevance to the 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 and Safety
 - * Community Health and Safety

6.6.4 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.

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

Construction Phase Impacts

Construction activities lead to temporary air emissions (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. In addition, Occupational Health and Safety (OHS) is an issue that needs to be properly managed during construction in order to minimise the risk of preventable accidents leading to injuries and / or fatalities. Proper OHS risk identification and management measures should be incorporated in every project's management plan and standard Engineering, Procurement and Construction (EPC) contractual clauses.

Response:

Impacts associated with the construction phase of the development have been identified and assessed as part of the detailed independent specialist studies undertaken as part of the BA process. Where applicable, appropriate mitigation measures with which to minimise the significance of construction phase impacts have been identified and included in the EMPr prepared for McTaggarts PV3 and attached as **Appendix M** to this BA Report.

Water Usage

Although water use requirements are typically low for solar PV plants, clusters of PV plants may have a high cumulative water use requirement in arid areas where local communities rely upon scarce groundwater resources. In such scenarios, water consumption should be estimated and compared to local water abstraction by communities (if any), to ensure no adverse impacts on local people. O&M methods in relation to water availability and use should be carefully reviewed where risks of adverse impacts to community usage are identified.

Response:

McTaggarts PV3 would require approximately 12 250m³ of water during the 12 -18-month construction period, and approximately 5 372m³ of water per year over the 20-year operational lifespan. The water required will be sourced directly from the Kai !Garib Local Municipality following a Service Level Agreement between the municipality and the proponent.

The recommendation that measures with which to minimise the project's water requirements must be investigated by the proponent are included in **Appendix M**

Land Matters

As solar power is one of the most land-intensive power generation technologies, land acquisition procedures and in particular the avoidance or proper mitigation of involuntary land acquisition/resettlement are critical to the success of the project. This includes land acquired either temporarily or permanently for the project site itself and any associated infrastructure – i.e., access roads, powerlines, construction camps (if any) and switchyards. If involuntary land acquisition is unavoidable, a Resettlement Action Plan (RAP) (dealing with physical displacement and any associated economic displacement) or Livelihood Restoration Plan (LRP) (dealing with economic displacement only) will be required. This is often a crucial issue with respect to local social license to operate and needs to be handled with due care and attention by suitably qualified persons.

Response:

McTaggarts PV3 is proposed on Portion 12 of Klip Punt 452 and Portion 3 of the Farm McTaggarts Camp 453. As the landowner is also the applicant no land acquisition will be required. No involuntary land acquisition or resettlement is required or will take place as a result of the project.

Landscape and Visual Impacts

Key impacts can include the visibility of the solar panels within the wider landscape and associated impacts on landscape designations, character types and surrounding communities. Common mitigation measures to reduce impacts can include consideration of layout, size and scale during the design process and landscaping / planting in order to screen the modules from surrounding receptors. Note that it is important that the impact of shading on energy yield is considered for any new planting requirements. Solar panels are designed to absorb, not reflect, irradiation. However, glint and glare should be a consideration in the environmental assessment process to account for potential impacts on landscape / visual and aviation aspects.

Response:

Potential visual impacts associated with the development of McTaggarts PV3 have been assessed as part of the Visual Impact Assessment specialist study (**Appendix I**) conducted as part of the BA process. Measures with which to avoid, or if avoidance is not possible minimise, and mitigate any negative visual impacts have been identified, and are contained within the EMPr prepared for the project and attached as **Appendix M** to this BA Report.

Ecology and Natural Resources

Potential impacts on ecology can include habitat loss / fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species. Receptors of key consideration are likely to include nationally and internationally important sites for wildlife and protected species such as bats, breeding birds and reptiles. Ecological baseline surveys should be carried out where potentially sensitive habitat, including undisturbed natural habitat, is to be impacted, to determine key receptors of relevance to each site. Mitigation measures can include careful site layout and design to avoid areas of high ecological value or translocation of valued ecological receptors. Habitat enhancement measures could be considered where appropriate to offset adverse impacts on sensitive habitat at a site, though avoidance of such habitats is a far more preferable option.

Response:

Potential ecological and avifaunal impacts associated with the development of McTaggarts PV3 have been assessed as part of the Ecology and Avifauna Impact Assessments (refer to **Appendix D** and **E**) conducted as part of the BA process. Measures with which to avoid, or if avoidance is not possible minimise, and mitigate any negative ecological and avifaunal impacts have been identified and are contained within the EMPr prepared for the project and attached as **Appendix M** to this BA Report. Areas of ecological and avifaunal sensitivity are reflected in an environmental sensitivity map prepared for the project (refer to Chapter 10 and **Appendix O**) and have been utilised to inform the development footprint so that such areas are suitably avoided.

Cultural Heritage

Potential impacts on cultural heritage can include impacts on the setting of designated sites or direct impacts on below-ground archaeological deposits as a result of ground disturbance during construction. Where indicated as a potential issue by the initial environmental review / scoping study, field surveys should be carried out prior to construction to determine key heritage and archaeological features at, or in proximity to, the site. Mitigation measures can include careful site layout and design to avoid areas of cultural heritage or archaeological value and implementation of a 'chance find' procedure that addresses and protects cultural heritage finds made during a project's construction and/or operation phases.

Response:

Heritage impacts associated with the development of McTaggarts PV3 have been assessed as part of the Heritage Impact Assessment (refer to **Appendix H**) conducted as part of the BA process, which includes the consideration of heritage, archaeological, and palaeontological resources. Measures to avoid, or if avoidance is not possible minimise, and mitigate any negative heritage impacts (including those on heritage, archaeology, and palaeontology) have been identified, and are contained within the EMPr prepared for the project and attached as **Appendix M** to this BA Report.

Transport and Access

The impacts of transportation of materials and personnel should be assessed in order to identify the most appropriate transport route to the site while minimising the impacts on project-affected communities. The requirement for any oversized vehicles/abnormal loads should be considered to ensure access is appropriate. On-site access tracks should be permeable and developed to minimise disturbance to sensitive environmental features. Where project construction traffic has to traverse local communities, traffic management plans should be incorporated into the environmental and social management plan and EPC requirements for the project.

Response:

The project development area can be readily accessed via the national route (N14) which is located 11km to the south of the broader study area and development area. The N14 national route provides access to the area from Upington, Kakamas, Keimoes and Johannesburg. The most appropriate access route will be utilised for the solar PV facility. To reach the facility development footprint, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). The facility layout has been determined following the identification of site related sensitivities.

The national, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase of the solar PV facility. Some of the components (i.e. on-site substation transformer) may be defined as abnormal loads in terms of the National Road Traffic Act (No. 93 of 1996) (NRTA) by virtue of the dimensional limitations. 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 the Act.

Drainage / Flooding

A review of flood risk should be undertaken to determine if there are any areas of high flood risk associated with the site. Existing and new drainage should also be considered to ensure run-off is controlled to minimise erosion.

Response:

A stormwater management plan has been prepared for the project and is included in **Appendix G** of the EMPr, prepared for the project and attached as **Appendix M** to this BA Report.

Consultation and Disclosure

It is recommended that early stage consultation is sought with key authorities, statutory bodies, affected communities and other relevant stakeholders. This is valuable in the assessment of project viability and may guide and increase the efficiency of the development process. Early consultation can also inform the design process to minimise potential environmental impacts and maintain overall sustainability of the project. The authorities, statutory bodies and stakeholders that should be consulted vary from country to country but usually include the following organisation types:

- » Local and / or regional consenting authority.
- » Government energy department / ministry.
- » Environmental agencies / departments.
- » Archaeological agencies / departments.
- » Civil aviation authorities / Ministry of Defence (if located near an airport).
- » Roads authority.
- » Health and safety agencies / departments.
- » Electricity utilities.
- » Military authorities.

Community engagement is an important part of project development and should be an on-going process involving the disclosure of information to project-affected communities. The purpose of community engagement is to build and maintain over time a constructive relationship with communities located in close proximity to the project and to identify and mitigate the key impacts on project-affected communities. The nature and frequency of community engagement should reflect the project's risks to, and adverse impacts on, the affected communities.

Response:

A Public Participation Process as prescribed by Chapter 6 of the 2014 EIA Regulations (GN R326) is being conducted as part of the BA process being undertaken for the project. This Public Participation Process includes consultation with key authorities, affected and surrounding landowners, local communities, and other relevant stakeholders.

Consultation between surrounding communities and the developer would also need to be undertaken during the planning and design phase of the proposed development.

Environmental and Social Management Plan (ESMP)

Whether or not an ESIA or equivalent has been completed for the site, an ESMP should be compiled to ensure that mitigation measures for relevant impacts of the type identified above (and any others) are identified and incorporated into project construction procedures and contracts. Mitigation measures may include, for example, dust suppression during construction, safety induction, training and monitoring programs for workers, traffic management measures where routes traverse local communities, implementation of proper waste management procedures, introduction of periodic community engagement activities, implementation of chance find procedures for cultural heritage, erosion control measures, fencing off of any vulnerable or threatened flora species, and so forth. The ESMP should indicate which party will be responsible for (a) funding, and (b) implementing each action, and how this will be monitored and reported on at the project level. The plan should be commensurate to the nature and type of impacts identified.

Response:

Impacts associated with the construction phase of development have been identified and assessed as part of the independent specialist studies undertaken as part of the BA process. Appropriate mitigation measures with which to minimise the significance of negative impacts have been identified and are included in the EMP_r prepared for the project and attached as **Appendix M** to this BA Report. The EMP_r is comprehensive for the nature and extent of the planned project.

CHAPTER 7: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This Chapter provides a description of the environment that may be affected by the development of McTaggart PV3. The information is provided in order to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. Aspects of the biophysical and social environments that could be directly or indirectly affected by the development or could affect McTaggart 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 BA process is being conducted.

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

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of the BA 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	<p>The environmental attributes associated with the development of McTaggart PV3 are included within this chapter. The environmental attributes that are assessed within this chapter include the following:</p> <ul style="list-style-type: none"> » The regional location of McTaggart PV3 is described in section 7.2. » The climatic conditions of Upington and the broader study area are included in section 7.3. » Biophysical characteristics of the development area, broader study area and the surrounding areas are described in section 7.3 and section 7.4. This includes the broader study area, climatic conditions, landscape features, geology, soil and land types, agricultural potential, hydrology and surface water, ecology, avifauna, heritage and palaeontology, visual, social and traffic. » Heritage resources, including the archaeology and palaeontology of the broader study area and development area are described in section 7.5. » The visual quality of the affected area surrounding McTaggart PV3 are described in section 7.6 » Social characteristics of the area surrounding McTaggart PV3 are described in section 7.7. » A description of the site accessibility and traffic profile of the broader study area and the surrounding areas is included in section 7.8.

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

7.2 Regional Setting

The Northern Cape Province is located in the north-western extent (**Figure 7.1**) of South Africa and constitutes South Africa's largest province, occupying an area of 372 889km² in extent, equivalent to nearly a third (30.5%) of the country's total land mass. It is also South Africa's most sparsely populated province with a population of 1 145 861, and a population density of 3.1/km². The capital city is Kimberley, and other important towns include Upington, Springbok, Kuruman, De Aar and Sutherland. It is bordered by the Western Cape, and Eastern Cape provinces to the south, and south-east, Free State, and North West provinces to the east, Botswana and Namibia, to the north, and the Atlantic Ocean to the west. The Northern Cape is the only South African province which borders Namibia and plays an important role in terms of providing linkages between Namibia and the rest of South Africa. The Orange River, which is South Africa's largest river, is a significant feature and is also the main source of water in the Province, while also constituting the international border between the Northern Cape (i.e. South Africa) and Namibia.

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

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

The Northern Cape offers unique tourism opportunities including wildlife conservation destinations, natural features, historic sites, festivals, cultural sites, star gazing, adventure tourism, agricultural tourism, ecotourism, game farms, and hunting areas, etc. The Province is home to the Richtersveld Botanical and Landscape World Heritage Site, which comprises a United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site under the World Heritage Convention. The province is also home to two (2) Transfrontier National Parks, namely the Kgalagadi Transfrontier Park, and the Richtersveld /Ai-Ais Transfrontier Park, as well as five (5) national parks and six (6) provincial reserves. In addition, the province plays a significant role in South Africa's science and technology sector, as it is home to the Square Kilometre Array (SKA), the Southern African Large Telescope (SALT), and the Karoo Array Telescope (MeerKAT). In addition, the Augrabies National Park, a major tourist destination in the Province is located 120km east of Upington near the town of Kakamas.

The Northern Cape is made up by five district municipalities, namely Francis Baard, John Taolo Gaetsewe, Namakwa, Pixley ka Seme and ZF Mgcawu (refer to **Figure 7.2**).

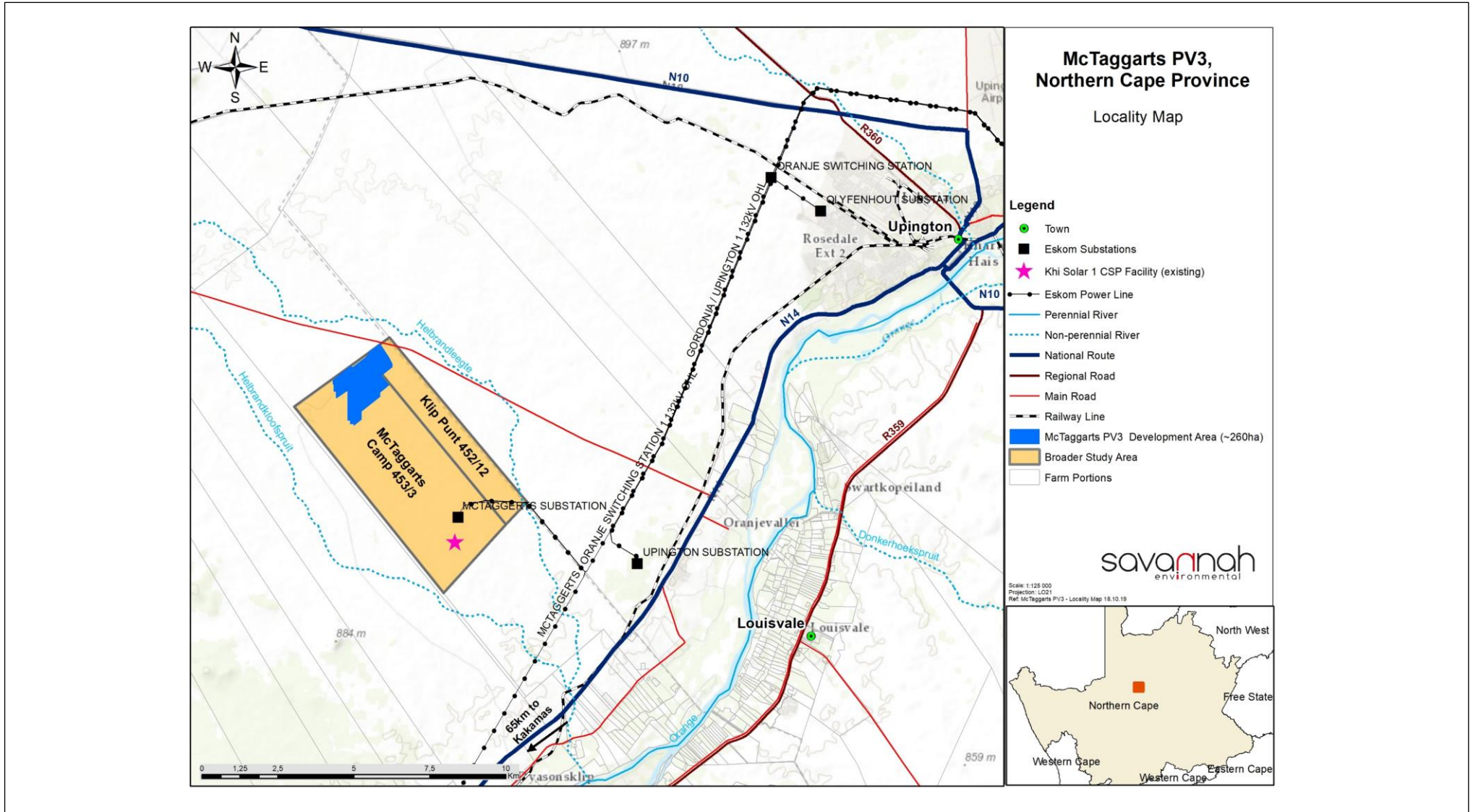


Figure 7.1: A locality map indicating the location of the broader study area for McTaggarts PV3 and its regional context.

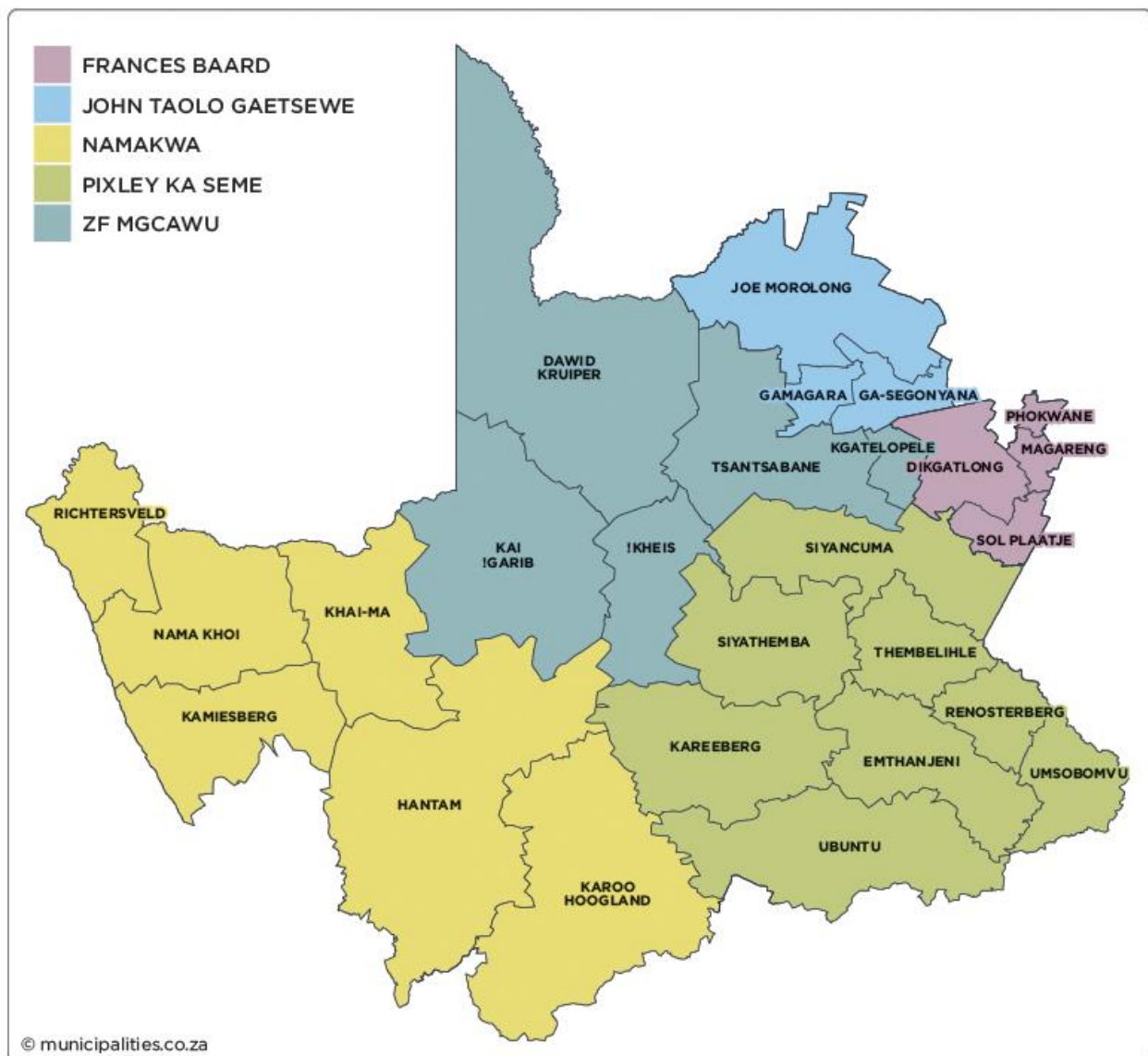


Figure 7.2: District municipalities of the Northern Cape Province (Source: Municipalities of South Africa)

The ZF Mgcawu District Municipality³⁰ (DM) is situated in the north-central extent of Northern Cape Province, and is bordered by the Namakwa DM to the south-west and south, the Pixley ka Seme DM to the south and south-east, the Frances Baard and John Taolo Gaetsewe DM to the east, Botswana to the north, and Namibia to the west. The ZF Mgcawu DM occupies an area of land of approximately 102 484km² in extent, which is equivalent to over one quarter (approximately 27%) of the Northern Cape Province. Approximately 65 000km² of the DM's land mass comprises the Kalahari Desert, Kgalagadi Transfrontier Park, and the former Bushman Land.

³⁰ Previously known as the Siyanda District Municipality

The ZF Mgcawu DM includes the town of Upington, which is the capital of the DM, and where the DM's seat of government is located. The town is also the largest town in the DM and is located on the banks of the Orange River. Upington is also the centre of the karakul sheep and dried-fruit industries and is the most northerly winemaking region in South Africa. Other prominent cities and towns located within the DM include, Beeshoek, Brandboom, Danielskuil, Eksteenskuil, Groblershoop, Kakamas, Keimoes, Kenhardt, Lime Acres, Mier, Postmasburg, and Rietfontein. The main economic activities within the DM include agriculture, mining, and tourism.

The ZF Mgcawu DM comprises five (5) local municipalities (LMs), namely Dawid Kruiper, Kai !Garib, Tsantsabane, Kheis and Kgatelopele (refer to **Figure 7.**).

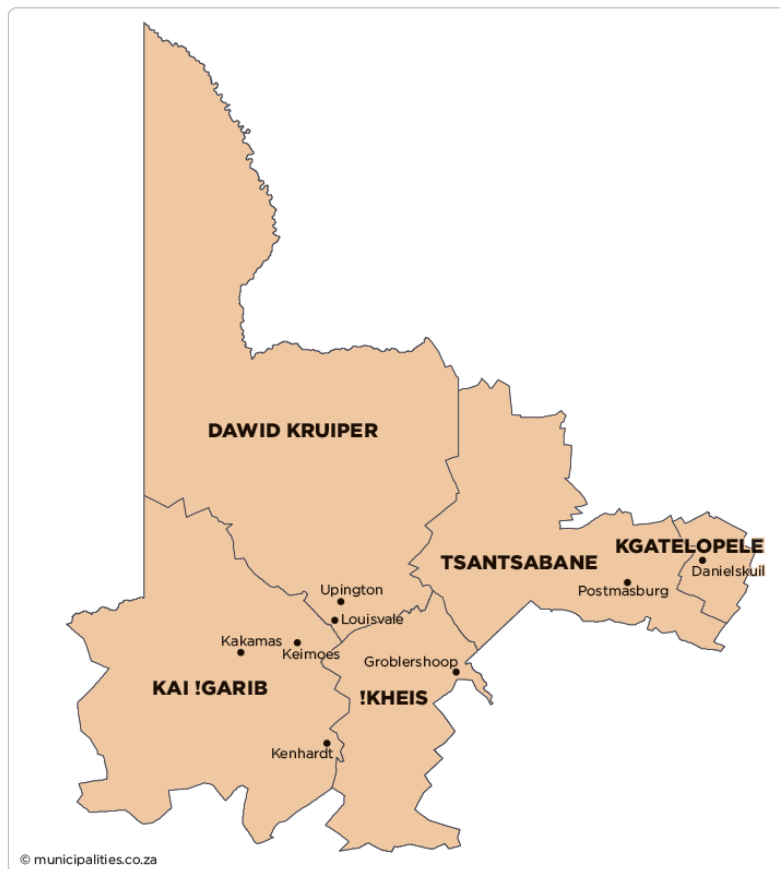


Figure 7.3: Local Municipalities of the ZF Mgcawu DM (Source: Municipalities of South Africa)

7.3 Local Setting: Location and Description of the Broader Study Area and Development Area

Broader Study Area

The broader study area, Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452,³¹ for McTaggarts PV3 is 2 904.7665ha in extent and comprises of two (2) properties which are currently used for renewable energy generation and grazing. The broader study area is located within the Kai !Garib LM and borders the Dawid Kruiper LM to the east.

The Kai !Garib LM is a Category B³² municipality and is situated along the Orange River within the ZF Mgcawu DM. It is bordered by the Dawid Kruiper LM in the north-east and Namibia in the north-west. The Kai !Garib LM is the second-largest of the five (5) LMs, with an extent of 26 377km², accounting for a quarter of the DMs geographical area³³. The key towns within the LM include Eksteenskui, Kakamas, Keimoes and Kenhardt. The agriculture sector with 52%, is the biggest contributor of the LM's GDP and of great importance to the economy of the ZF Mgcawu DM. The government and services sector contributes 16%, the wholesale and retail trade sector 11%, the financial services sector 7.6% and the manufacturing sector 5%.

The majority of the area is sparsely populated and consists of an undulating landscape of wide-open expanses. The local population is primarily concentrated in the town of Upington and smaller towns / settlements along the Orange River. In addition, the area surrounding the broader study area is characterised as a semi-arid desert region and vegetation cover is restricted to low shrublands, described as the Kalahari Karroid Shrubland and the Gordonia Duneveld. Vineyards and cotton field plantations are found along the banks of the Orange River located to the south of the broader study area which flows towards Keimoes, Kakamas and other towns in the Northern Cape Province. Furthermore, the towns of Upington, Keimoes and Kakamas, and the broader study area for McTaggarts PV3 are characterised by some of the highest levels of solar irradiation in the country; therefore making the area an ideal location for solar energy production. As such, Upington and the broader study area for McTaggarts PV3 fall within the Northern Cape Solar Corridor and the Upington Renewable Energy Development Zone (REDZ) as identified by the DEA.

The Upington REDZ (also referred to as, 'Zone 7') has been specifically identified as an area where large-scale solar PV facilities can be developed in terms of the Strategic Integrated Projects (SIP) 8. The REDZ area in this region, stretches from the south of the N10 national road and Upington in the north, to Kenhardt and Marydale in the south, and from Keimoes in the west, to Groblershoop in the east. The broader study area for McTaggarts PV3 is located along the northern boundary of the Upington REDZ.

The broader study area is also located adjacent to the Lutzputs gravel and the N14 national roads which routes along the eastern and southern boundaries of the broader study area. The Lutzputs Road provides

³¹ Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452 are the affected properties for the development of McTaggarts PV3.

³² A municipality that shares municipal executive and legislative authority in its area with a District Municipality within whose area it falls: <https://www.brandsouthafrica.com/governance/government/south-african-local-and-municipal-governments>

³³ <https://municipalities.co.za/overview/1183/kai-garib-local-municipality>

direct access to the broader study area; whereas, the N14 national road links the town of Upington with the towns of Kuruman, Kathu, Keimoes, Kakamas, Pofadder, Aggeneys, Springbok and Johannesburg. Upington is the nearest town to the broader study area and is located approximately 18km to the north-east of the area.

i. Climatic Conditions

The suitability of a site for the development of a solar energy facility is dependent on the prevailing climatic condition of the area. The viability of the solar energy facility is directly affected by the amount of solar irradiation received in the area. The Global Horizontal Irradiation (GHI) for the Northern Cape Province varies between 2 045 and 2 377kWh/m²/annum, which is present within the higher end of the spectrum. The irradiation received in Upington and the location of the broader study area for McTaggarts PV3 is approximately 2 278kWh/m²/annum which is the highest in South Africa, and comparable on a global scale (refer to **Figure 7.4**).

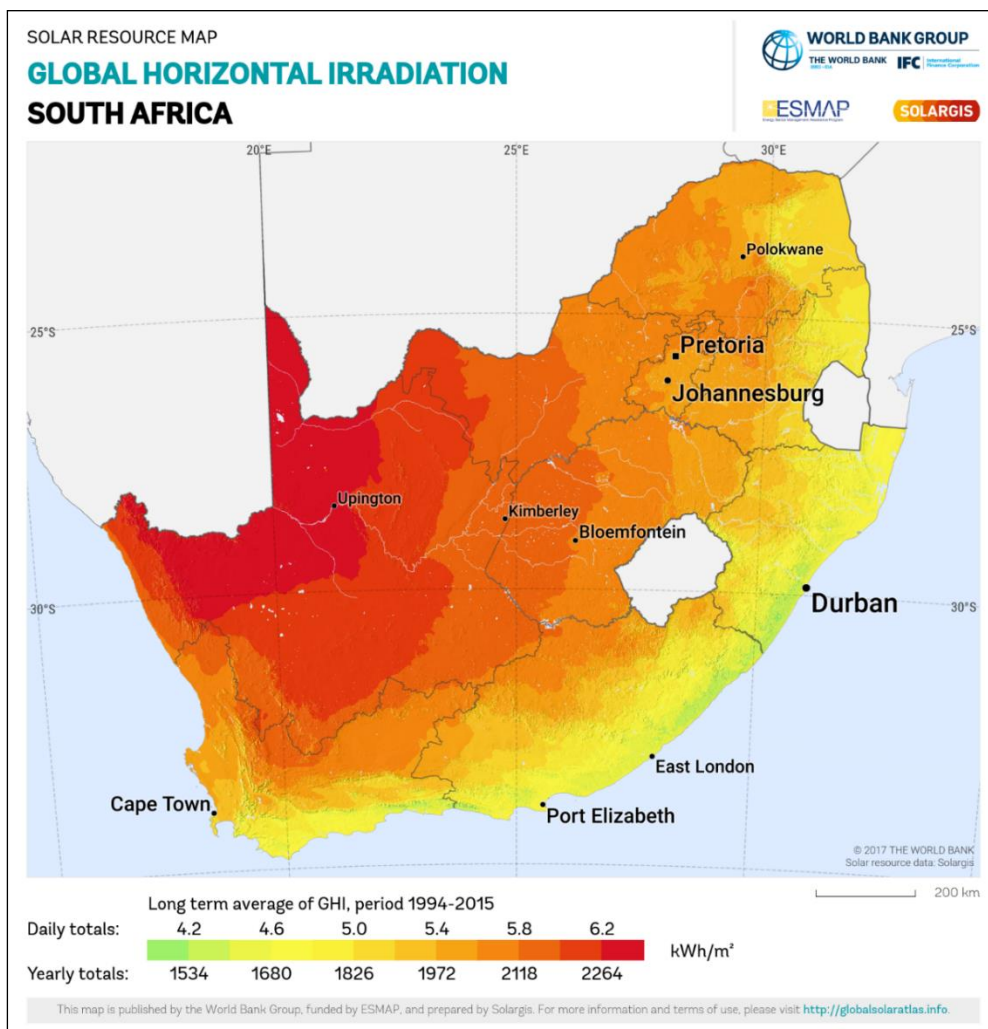


Figure 7.4: GHI map for South Africa (Source: World Bank Group Solar Map). The broader study area for McTaggarts PV3 is shown by the yellow star on the map.

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

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

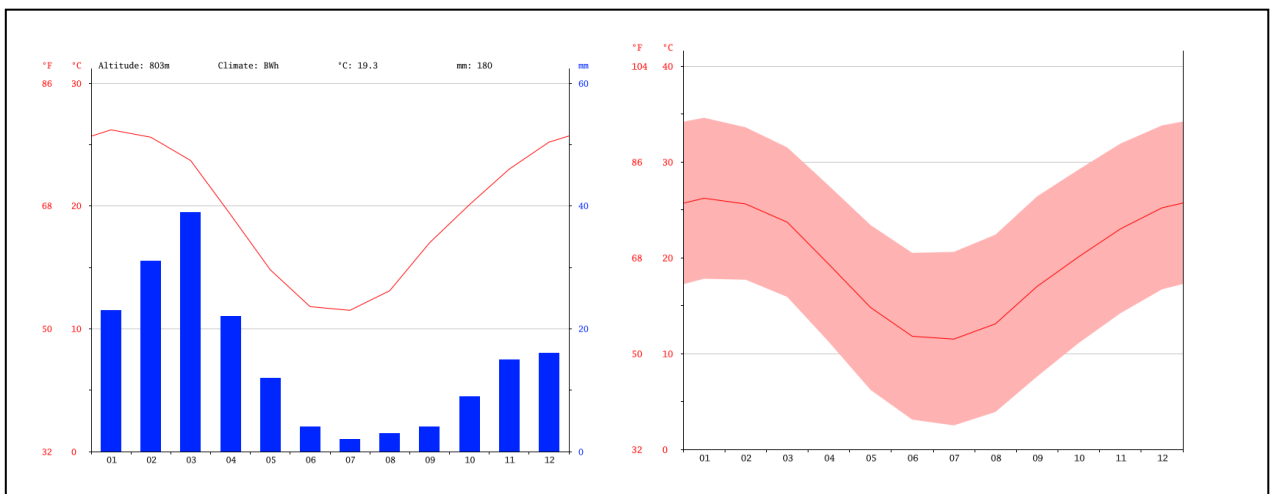


Figure 7.5: Climate and Temperature graphs for Upington, Northern Cape Province (Source: en.climate-data.org).

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

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

ii. Landscape Features

The topography of the broader study area is relatively homogenous and is described predominantly as lowlands with hills and dune hills to the north. Relatively prominent small hills occur towards the west and south-west of the broader study area.

The terrain surrounding the affected properties, Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452, is generally flat and sloping towards the Orange River Valley which forms a

distinct hydrological feature in the region. There are two minor non-perennial (or ephemeral) watercourses, the Helbrandkloofspruit and the Helbrandleegte that run to the north-east and south of the broader study area respectively before they flow into the Orange River Valley. Furthermore, there are other minor ephemeral watercourses that flow into the Orange River intermittently. As these watercourses flow from the undulating plain into the shallow river valley, they have created larger and slightly deeper valleys which are obvious along the N14 national road towards Keimoes.

Although the region surrounding the broader study area is generally flat, a degree of relief is provided by minor ridgelines that form a historic dune field that runs in a general north-west to south-east direction at regular intervals. From the air, these minor ridgelines appear as a series of waves in the arid landscape of the broader study area. In addition, these ridgelines rise between 3-5m above the valley floor of the Orange River Valley.

iii. Geology

The Namaqua sector of the Namaqua-Natal Metamorphic Province is the geological setting of the region around Upington, including the broader study area and development area. The Province consists of igneous and metamorphic rocks that were formed or metamorphosed during the Namaqua Orogeny ca. 1 200 – 1 000 million years ago. The Namaqua-Natal Province is bounded by shear zones and has been divided into numerous tectonostratigraphic terranes (which have also been intruded by ultramafic – mafic intrusions) based on common rock names. The broader study area of McTaggarts PV3 falls within the Areachap Terrane and is bounded to the north – east by the Brakbosch – Trooillaspan Shear Zone and to the south – west by the Boven Rugzeer Shear Zone.

The area surrounding the broader study area is associated with scattered outcrops of the Louisvale Granites, Gneisses of the Bethesda and Toeslaan formations. Overlying these ancient rocks are much younger sediments of the Tertiary and Quaternary age, in particular calcretes that indicate drying out of the surface with alluvial and aeolian sands of the Gordonia Formation. The broader study area identified for the development of McTaggarts PV3 overlies the above mentioned lithologies (refer to **Figure 7.6**).

iv. Soil and Land Types

A land type is defined as an area with a uniform terrain type, macroclimate and broad soil pattern. The broader study area, including the development area, for McTaggarts PV3 is underlain by the following land type:

- » Ae10: this land type consists of a mixture of shallow Mispah soils as well as shallow red apedal soil profiles underlain by limestone (either soft or hard pan carbonate horizons). This land type is underlain by migmatites, gneisses and ultra-metamorphic rocks of the Namaqua-Natal Metamorphic Province and dominated by flat plains and depression areas where water can accumulate following rainfall events (**Figure 7.7**). The entire extent of the development area of McTaggarts PV3 is located within this land type.

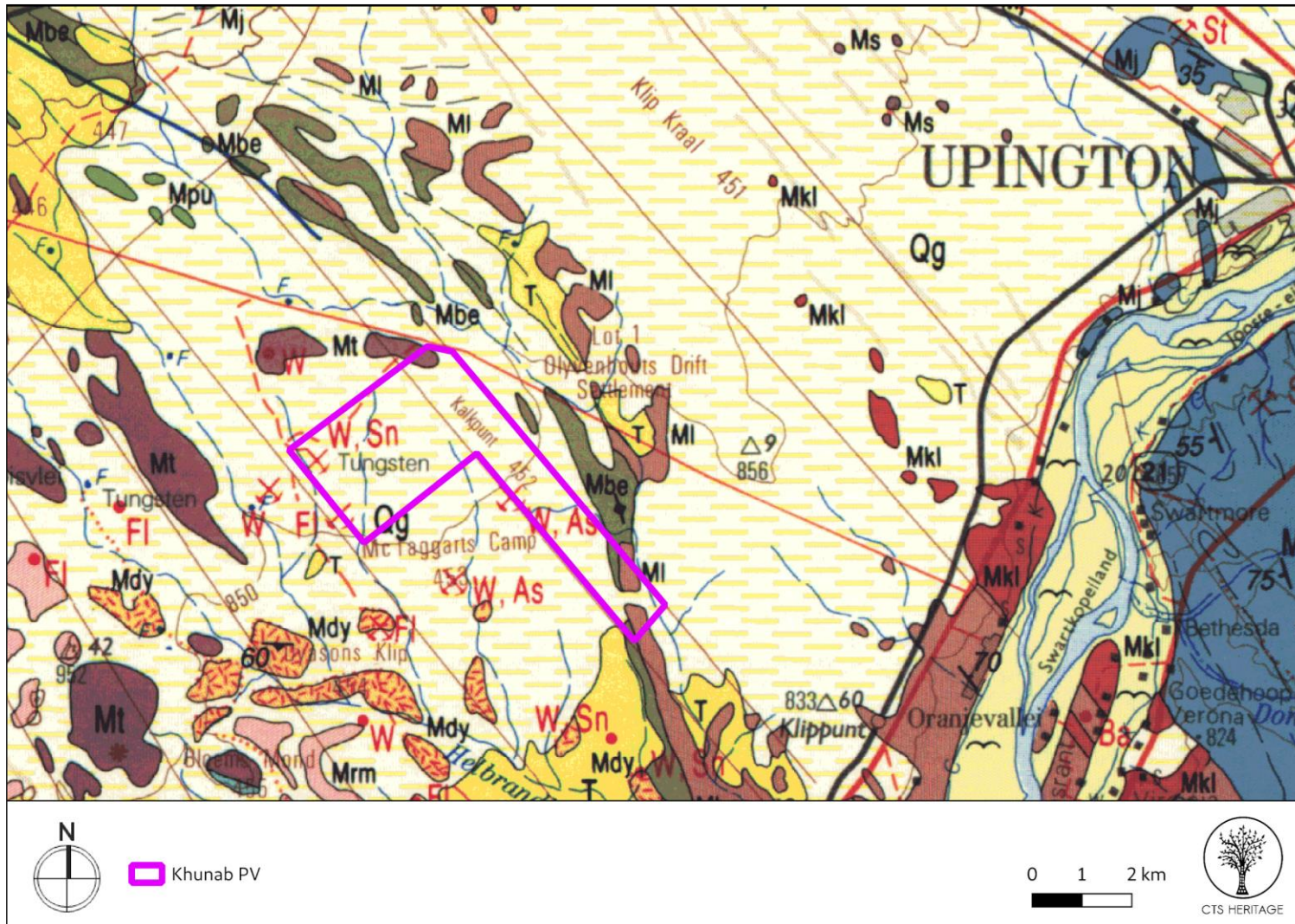


Figure 7.6: Extract from the 1:250 000 Geological Map of South Africa: Council of GeoScience Map 2820 Zoomed in. [Qg: Gordonia Formation (Quaternary cover sands) Mbe: Bethesda Formation Mj: Jannelsepan Formation Mkl: Keimoes Formation Ms: Straussburg Granite.

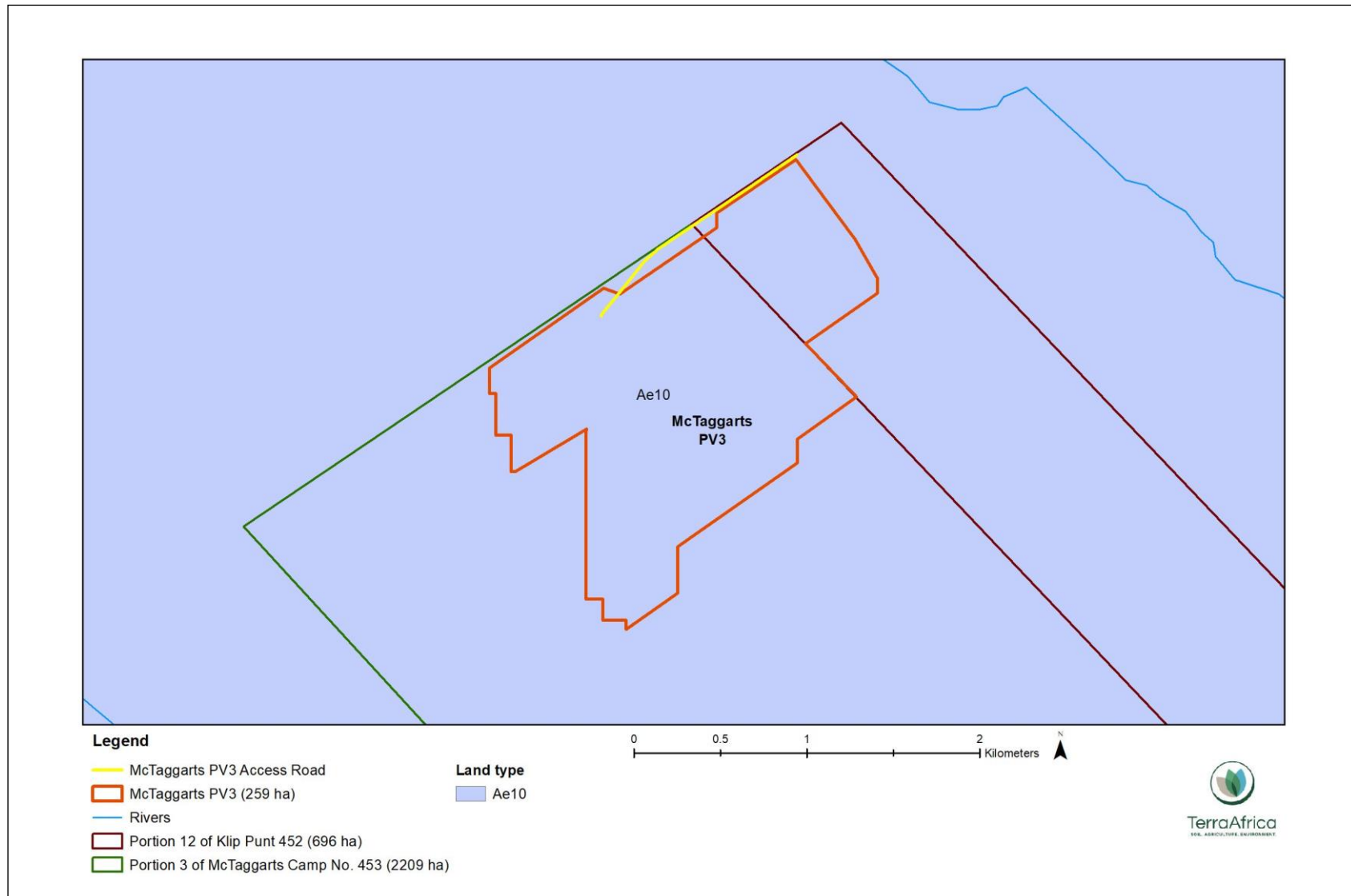


Figure 7.7: Land Type Map of the McTaggarts PV3 broader study area and development area.

v. Agricultural Potential

The entire extent of the broader study area (including the main access road), Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452 has limited to no suitability for rainfed crop production. Data released by the DAFF in 2017, indicates that the broader study area has a very low to low land capability for crop production and it is better suited to livestock grazing. While the Upington region is known for its high-quality horticultural products, these are only produced where irrigation water and infrastructure are present along the Orange River. No irrigation infrastructure or alternative irrigation supply is present within the development area for McTaggarts PV3.

vi. Hydrology and Surface Water

McTaggarts PV3 is located within the Lower Orange Water Management Area (WMA) (refer to **Figure 7.8**). Major rivers within the Lower Orange WMA include the Ongers, Hartebeest and Orange rivers. The extent of the Orange River WMA includes the stretch of Orange River between the Orange – Vaal confluence and Alexander Bay. Other tributaries include the Ongers and the Hartebeest rivers from the south and the Molopo and Fish River in Namibia from the north.

There are numerous intermittent watercourses along the coast in the Northern Cape which drain into the Atlantic Ocean. The Lower Orange catchment is the largest, but also the driest and most sparsely populated catchment in South Africa.

The broader study area for McTaggarts PV3 is located within the D73 tertiary and the D73E quaternary drainage regions (refer to **Figure 7.8**). Multiple non-perennial tributaries traverse the broader study area for McTaggarts PV3 and drain into the Helbrandleegte watercourse which flows into the Orange River downstream.

Several small depression / pan wetlands were located within the general area, and one is located within the development area and development footprint. The National Wetland Inventory v5.2 spatial data, also indicated two other wetlands 2 km upstream of the broader study area but these were confirmed to be alluvial channels thus misidentified in that database. In terms of the National Freshwater Ecosystems Priority Areas (NFEPA) assessment, all the systems within the catchment associated within the development have been assigned a condition score of AB, indicating that they are largely intact and perform an ecological function. However, the broader study area systems are ephemeral and only carried water for a short week long period in 2014, therefore the observed development area systems don't support any wide riparian zones.

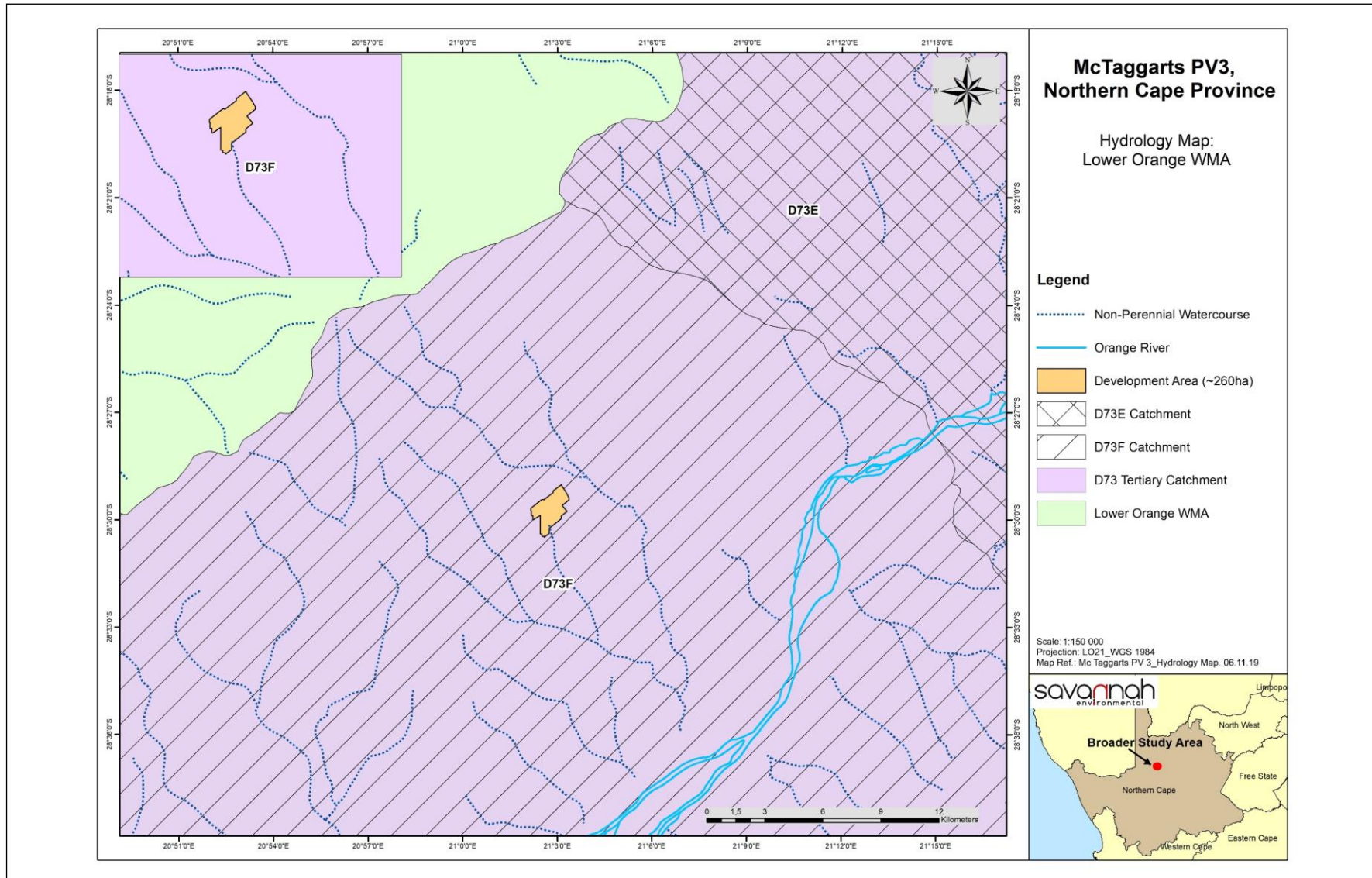


Figure 7.8: A map showing the catchment area within which the McTaggarts PV3 broader study area and development area is located.

Development Area

The entire extent of the development area of McTaggarts PV3 is located within Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452. The area is 260ha in extent and will accommodate the layout proposed for the facility, which is anticipated to occupy an area not exceeding 210ha. Settlement areas located in the vicinity of the development area include, Ses Brugge, Klippunt, Dyasons Klip Settlement, Oranjevallei, Louisvale and Kanoneiland. These communities are regarded as low-income earning communities with low cost and informal housing. The residents of the communities are employed by the local agricultural sector in the area, particularly viticulture and fruit farms and associated agro-processing facilities.

Land uses within the vicinity of the development area include the operation of the 50MW Khi Solar One Concentrated Solar Power (CSP) facility³⁴ (**Figure 7.9**), which is located in the southern corner of Portion 3 of the Farm McTaggarts Camp 453. Within the north-western corner of the property, the remains of old Tungsten mining activities and limited mining infrastructure are present, which as a result has led to the degradation of the natural environment. Sheep farming is also being undertaken within the vicinity of the development area.

Furthermore, major linear infrastructure within the vicinity of the development area include the road infrastructure (i.e. the N14 and the Lutzputs Road, etc.) and grid connection infrastructure. Grid connection infrastructure available in the vicinity of the development area include, the Upington Main Transmission Substation located 10km to the south-east of the development area and adjacent to the N14 national road and the McTaggarts/Oasis 1 132kV power line.



Figure 7.9: A view of the operational Khi Solar One located in the southern corner of Portion 3 of the Farm McTaggarts Camp No. 453 (source: www.energy.org.za).

³⁴ Khi Solar One has been operational since February 2016.

7.4. Ecological Profile of the Broader Study Area and Development Area

Broad-Scale Vegetation Patterns

According to the National Vegetation Map (Mucina & Rutherford, 2006), the broader study area consists of two (2) vegetation types, the Kalahari Shrubland and the Bushmanland Arid Grassland (refer to **Figure 7.10**). However, the development area for McTaggarts PV3 only consists of the Kalahari Karroid vegetation type.

Both the Kalahari Karroid Shrubland and Bushmanland Arid Grassland are classified as Least Threatened with more than 99% of their original extent still intact. Both vegetation types are considered Hardly Protected within formal conservation areas. Mucina & Rutherford (2006), list 6 endemic species for Bushmanland Arid Grassland, while no vegetation-type endemic species are known from Kalahari Karroid Shrubland. The biogeographically important and endemic species known from these vegetation types tend to be widespread within the vegetation type itself. The Bushmanland Arid Grassland vegetation type, which occurs, in the southern portion of Portion 12 of the Farm Klip Punt 452, is widely distributed and is among the most extensive vegetation types in South Africa; whereas the Kalahari Karroid Shrubland is less extensive, but represents a transitional vegetation type between the northern Nama Karoo and the Kalahari (Savannah) vegetation types.

Species commonly observed within the areas of Kalahari Karroid Shrubland include, shrubs such as, *Leucosphaera bainesii*, *Hermannia spinosa*, *Monoechma genistifolium*, *Salsola rabieana*, *Aptosimum albomarginatum*, *A.spinecens*, *Kleinia longiflora*, *Limeum argute-carinatum*, *Phyllanthus maderaspatensis*, *Zygophyllum dregeanum* and grasses such as *Stipagrostis anomala*, *S.ciliata*, *S.uniplumis*, *S.hochstetteriana* and *Schmidtia kalariensis*. The proportion of shrubs in this vegetation type is usually related to soil depth and texture, with the proportion of grass increasing as the soils become deeper or sandier. Species of conservation concern that may be present include, *Adenium oleifolium*, *Aloe claviflora* and *Hoodia gordonii*, although none of these species were observed within the development area of McTaggarts PV3.

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

Listed Plant Species

Two protected tree species listed under the National Forest Act (Act No. 85 of 1998) (NFA), as amended, occur within the development area including *Vachellia (Acacia) erioloba* and *Boscia albitrunca*. Both of these species are associated largely with the drainage lines present within the development area.

In addition, the provincially protected *Boscia foetida* is also confirmed present within the broader study area and is fairly widespread across the area, at a moderate density. The density of the species within the development area is not significant.

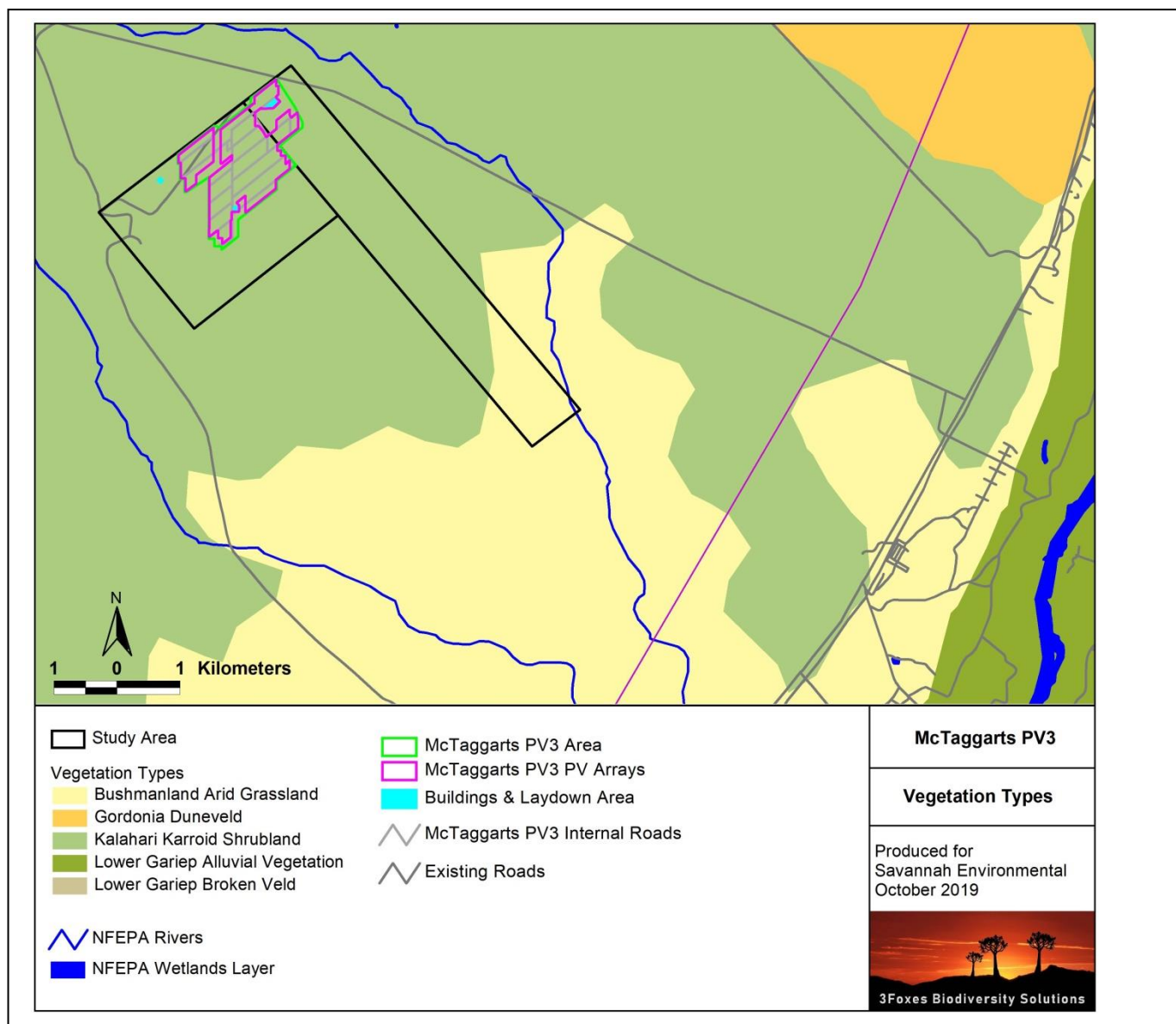


Figure 7.10: A broad-scale overview of the vegetation in and around the broader study and development area for McTaggarts PV3. The Vegetation Map is an extract of the National Vegetation Map (Mucina and Rutherford, 2006 and 2016) and includes drainage lines delineated by the National Freshwater Ecosystem Priority Areas (NFEPA) Assessment (Net *et al.*, 2011)

Critical Biodiversity Areas (CBA) and Broad-Scale Processes

An extract of the Northern Cape Critical Biodiversity Areas (CBAs) map for the broader study area and the development area is depicted in **Figure 7.11**. The entire extent of development area lies within an area classified as Other Natural Areas (ONA). The drainage lines adjacent to the development area, to the east, west and south-east are classified as ecological support areas (ESAs); however, the development area for McTaggarts PV3 has avoided these drainage lines. There are no CBAs located within the development area of McTaggarts PV3.

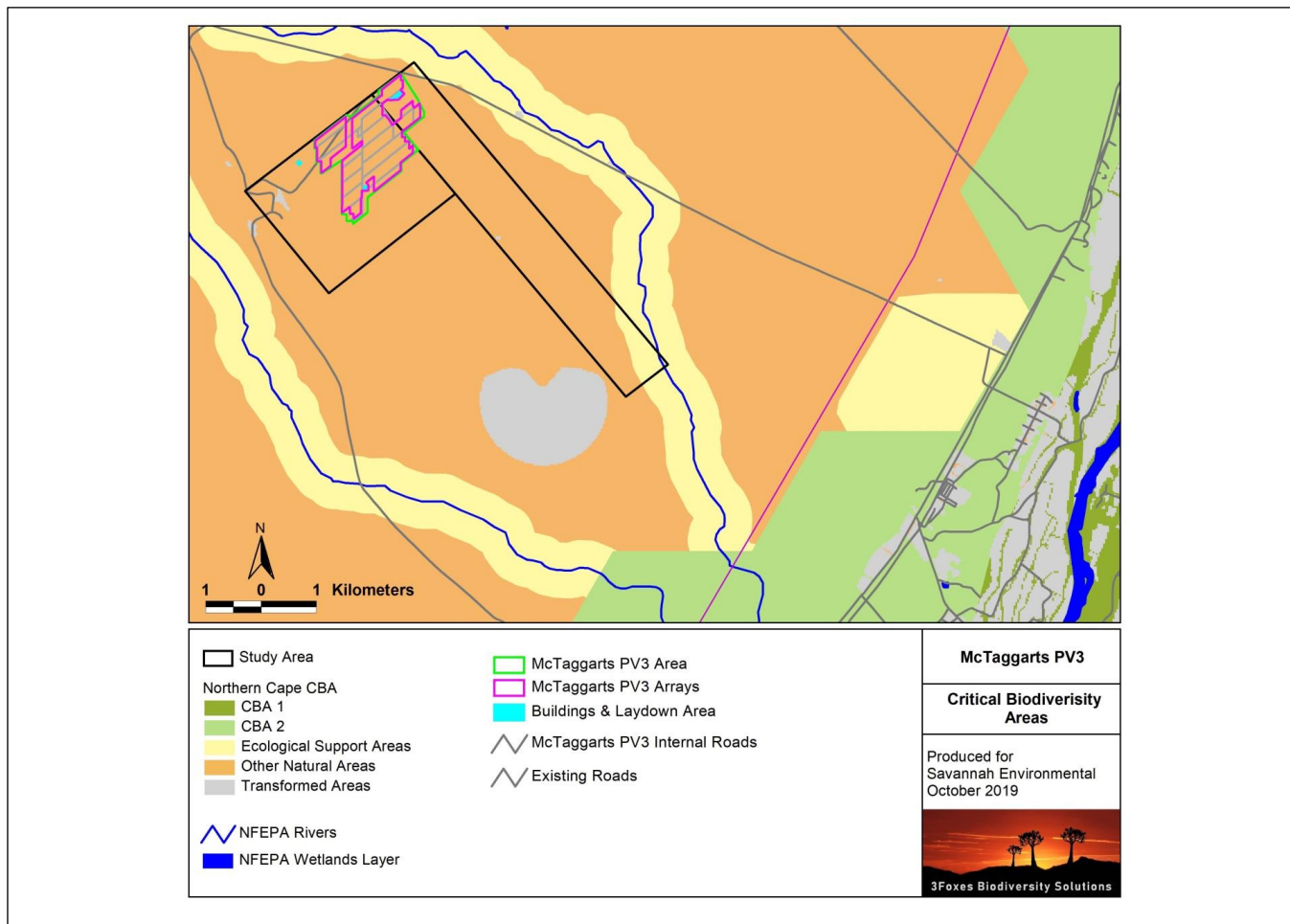


Figure 7.11: An extract of the Northern Cape CBA Map for the broader study area and the development area, showing that there are no CBAs in close proximity to the development area identified for the establishment of McTaggarts PV3.

Faunal Communities

1 Mammals

The broader study area falls within the distribution range of 46 terrestrial mammals, indicating that the mammalian diversity of the area is of moderate potential. The variety of habitat present within the development area is fairly low and the overall mammalian diversity is expected to be lower than the broader study area. The lack of rocky hills or outcrops within the development area precludes a variety of species from the area. However, terrestrial mammal species that can be confirmed present within the development area, based on field observations or are known from adjacent sites within the vicinity of McTaggarts PV3 include, the Black-backed Jackal, African Wild Cat, Cape Fox, South African Ground Squirrel, Slender Mongoose, Cape Hare and the Aardvark. Species such as the Cape Clawless Otter and Water Mongoose may also occasionally be present in the rainy season. During the rainy season, these species apparently make forays from the Orange River to visit some of the larger pans in the Upington area. For such species, the drainage lines present in the development area and broader study area represent important movement corridors.

Two Red-listed terrestrial mammal species which may occur within the broader study area of McTaggarts PV3 include, the Near Threatened Brown Hyaena (*Hyaena brunnea*) and the Vulnerable Black Footed Cat (*Felis nigripes*). While it is possible that both species may occur within the broader study area, it is likely that the Brown Hyaena is present as this species is often purposely or inadvertently persecuted within farming areas. These two species have a wide national distribution.

2 Reptiles

According to the South Africa Reptile Conservation Assessment (SARCA) Database, 39 reptile species are known from the broader study area suggesting that the reptile diversity within the area is likely to be moderate to low. Furthermore, as there are no significant rocky outcrops within the development area, only species associated with sandy substrates or trees are likely to be present. Species observed within the development area and the vicinity of the broader study area include, the Namaqua Mountain Gecko (*Pachydactylus montanus*), Ground Agama (*Agama aculeata*), Spotted Sand Lizard (*Pedioplanis lineocellata*) and the Spotted Desert Lizard (*Meroles suborbitalis*). No reptile species of conservation concern are known from the broader study area and there appears not to be any broad habitats within the area which would be of a high significance for reptiles.

3 Amphibians

The broader study area lies within the distribution range of 10 amphibian species. The only listed species which may occur within the area is the Giant Bullfrog (*Pyxicephalus adspersus*) which is listed as Near Threatened. No suitable breeding sites were observed in or near the development area for McTaggarts PV3, therefore it is not likely that this species is present. Furthermore, as there are no natural perennial watercourses within the broader study and development area it is likely that amphibian abundance is generally low and will be restricted to those species which are relatively independent of water such as the Karoo Toad (*Vandijkophrynus garipeensis*).

4 Avifauna

Approximately 150 avian species are known to occur within the broader study area and the surrounding area. A total of 68 species were recorded within the broader study area and development area during the two seasonal field site surveys undertaken in late summer of 2019 (9 - 12 April) and spring (4 - 8 October) respectively. Eight (8) of these species are listed as Threatened and four (4) are considered as Near-Threatened, whereas seven (7) are considered as endemic avian species of South Africa and another twelve (12) as biome-restricted avian species.

The bird assemblage recorded within the broader study area is fairly typical of the Kalahari bioregion with elements of the Nama-Karoo bioregion. Based on information derived from the South African Bird Atlas Project (SABAP1), approximately 68 avifauna species are anticipated to occur within the broader study area and development area for McTaggarts PV3. Of the 68 species recorded, 56 of them were detected during walking transects, with 44 and 40 species recorded during spring and the late summer avifauna surveys. Small passerines make up 64% of the species detected, compared to non-passerines with 20%.

Species with a high abundance which exhibited the most stable trends between the two seasons of field survey include the Spike-heeled Lark (*Chersomanes albofasciata*), Sabota Lark (*Calendulauda sabota*) and the Chat Flycatcher (*Bradornis infuscatus*). In addition, less abundant species with stable trends

include the Yellow Canary (*Crithagra flaviventris*), Southern Fiscal (*Lanius collaris*), Bokmakierie (*Telophorus zeylonus*) and the Dusky Sunbird (*Cinnyris fuscus*). Primarily resident species which showed high and unexpected variable detections between the two seasons include the Eastern Clapper Lark and the Rufous-eared Warbler.

The majority of the seven (7) near-endemic species can be considered as being scarce within the area and include, the Karoo Thrush, Fiscal Flycatcher, Fairy Flycatcher, Sickle-winged Chat, the nomadic Black-headed Canary (0%), and the Jackal Buzzard (0%). Only the highly nomadic Black-eared Sparrowlark has been recorded with a fair reporting rate (33%), although only one sighting was made during the late summer field survey. However, the Karoo Thrush and the Fiscal Flycatcher are both common in the nearby habitats associated with the Orange River such as the riverine thickets.

Seven (7) of the twelve (12) biome – restricted species known from the area were recorded during the field surveys including the Sociable Weaver, Karoo Korhaan, Kalahari Scrub Robin, Black-eared Sparrowlark, Stark's Lark, Tractrac Chat and the Karoo Chat.

Avifaunal microhabitats from the broader study area can be distinguished, namely the plains microhabitat associated with the Kalahari Karroid Shrubland and the small drainage lines that traverse the broader study area. The differences in species composition between the avifaunal micro-habitats were subtle. The drainage lines and pan support denser vegetation in comparison to the plain's habitat (refer to **Figure 7.12** and **13**). Therefore, the drainage lines were characterised by higher occurrences of species preferring a woodier habitat such as the Mousebirds, Scrub Robin, Dusky Sunbird, Black-chested Prinia and the Acacia Pied Barbet. In contrast, numerous lark species recorded within the broader study area were generally associated with the more sparsely open plains. In general, other species such as the Chat Flycatcher, Southern Fiscal, Ant-eating Chat and the Yellow Canary are more cosmopolitan in their use of the habitats.

Five (5) of the eight (8) threatened species known from the broader study area were recorded during the field survey and another two (2) of the four (4) Near-Threatened species. The most important from the red-listed species in the area is the Critically Endangered White-backed Vulture. The broader study area is currently partly being used for livestock grazing; therefore, the vultures may occasionally be passing in the area during foraging forays. Although, there are no breeding or nesting sites for this species nearby, due to the absence large *Acacia erioloba* trees, the White-backed Vulture is still considered as an occasional visitor to the area, corroborated by its infrequent presence in the area based on SABAP records. Furthermore, the Martial Eagle was also recorded in the area on two occasions, perched on utility poles proximal to the broader study area. This species probably breeds on large pylons within the vicinity of the broader study area; therefore, it is probable that the martial eagles are a resident. However, there are no suitable nesting sites within the broader study area and development area for McTaggarts PV3 for these species.

The two (2) Near-Threatened species that were recorded during the field surveys include the Karoo Korhaan and the Kori Bustard. The Karoo Korhaan was recorded along the eastern boundary of the broader study area where the gravel plains habitat dominates, and which is also their preferred habitat. A Lanner Falcon was also observed on a pylon a few kilometres south of the broader study area; therefore, this species may be occasionally frequent the area during hunting forays. It is also suspected that a pair of Secretary Birds nest in the vicinity of the broader study area, however, during the site visits no sightings were made. The Secretary Birds are known to have bred in the past within the vicinity of the Khi Solar One CSP facility prior to its construction. All other red-listed species within the area have low SABAP2 reporting rates

and these include, the Black Stork, Pallid Harrier and the Abdim's Stork. The populations of these species within the local area are moderate to low as they appear to be occasional visitors based on their low reporting rates in the area. The broader study area and surrounds do not provide a suitable breeding or feeding habitat for these species. The stork species in particular, frequent the riparian habitat near the Orange River.

In general, the majority of the avifauna of the surrounding environment appears fairly similar to that found across the Kalahari and the Nama-Karoo bioregions in the Northern Cape Province. There is an absence of communal or solitary roosting and nesting sites for red-listed species within the broader study area. A number of species do occur in the area primarily for foraging and large tracks of suitable habitat remain within the surrounding environment, particularly to the north of the broader study area.

Species which clearly use the surrounding environment as part of their foraging ranges include the White-backed Vulture, Lappet-faced Vulture, Martial Eagle, Tawny Eagle, Lanner Falcon and the Secretary Bird. Two (2) Near-Threatened species, namely, the Karoo Korhaan and the Kori Bustard are strictly ground-dwelling foragers and while they occur in the area they also have very wide national ranges.



Figure 7.12: Views of the plain's habitat of the Kalahari Karroid Shrubland along the southern boundary of the broader study area



Figure 7.13: Views of an ephemeral drainage line within the broader study area for McTaggarts PV3. This habitat is a preferred habitat for species such as Sociable Weavers which are abundant within the eastern boundary of the broader study area and its surrounds.

7.5. Heritage Resources, including archaeology and palaeontology

7.5.1 Archaeology and the Built Environment

The greater Upington area has a rich historical and archaeological past, which includes Stone Age artefacts of varying significance. In terms of the broader study area for McTaggarts PV3, no significant heritage resources were identified (**Figure 7.14**). Stone Age occurrences were identified, and these consist of isolated finds and low-density ex-situ surface scatters containing predominantly Middle Stone Age (MSA) material with a few incidences of Early and Later Stone Age (LSA) lithics. The majority of the raw material utilised for the lithics found is from the Banded Iron Formation (BIF) and Quartzite. Over 90% of the lithics recorded consist of flakes, cores, chunks and debris, with three (3) hollow scrapers, two (2) bifacial scrapers, a punch, and blades making up the remainder. Whether indicative of the original discard patterns, or subsequent displacement by erosion and animal activity, the material is too scattered to be connected to knapping³⁵ sites, and no evidence of concurrent human occupation was found in association with the lithics.

³⁵ Knapping is the shaping of flint, chert, obsidian or other conchoidal fracturing stone through the process of lithic reduction to manufacture stone tools, strikers or flintlock firearms, or to produce flat-faced stones for building.

Several occurrences of archaeological surface material dating to the 19th and early 20th century was recorded. These include two (2) Martini-Henry bullet casings dating between 1870 and the turn of the century. The area around the development area is well known for the conflict between the British forces and the Koranna people who lived on the Orange River islands. The region was also actively monitored by the Cape Colonial Police as from the 1890s and during the military operation of the Anglo Boer War (1899 – 1902). The spent cartridges, are of little scientific value; therefore, they are without context and only a small sample was identified.

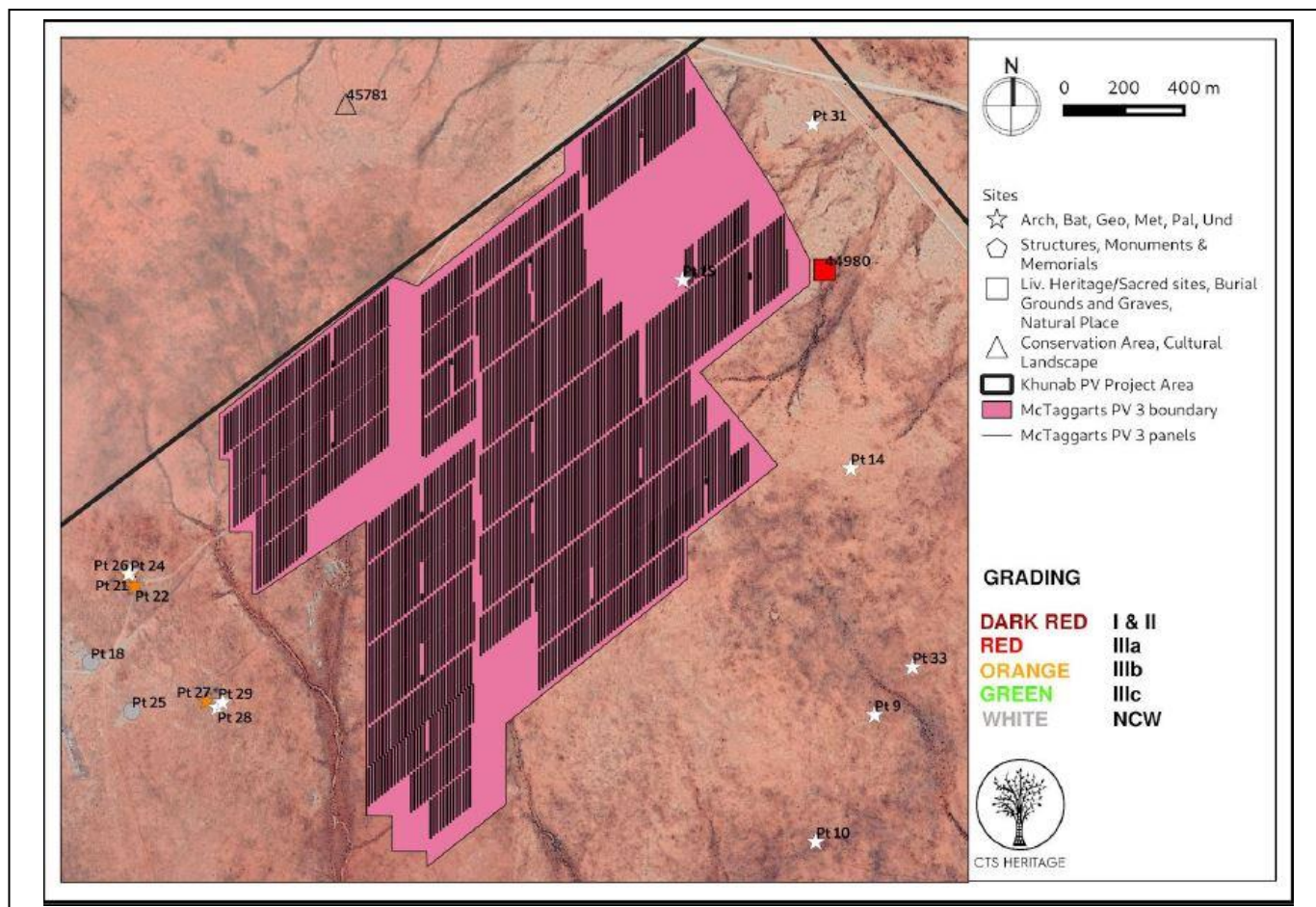


Figure 7.14: A map illustrating the heritage sites identified within the broader study area and development area of McTaggart PV3.

7.5.2 Palaeontology

According to the SAHRIS Palaeosensitivity Map (**Figure 7.15**), the broader study area is underlain by the Gordonia Formation, the Bethesda Formation, the Jannespan Formation, the Keimoes Formation and the Strausburg Granite. The majority of these lithologies are igneous or metamorphic rocks, which renders them unfossiliferous. The alluvial and aeolian sands of the Gordonia Formation have been transported; therefore, these are unlikely to preserve any fossil heritage. There is a small probability of finding fossils, provide palaeo-channels and rivers are present, however, none of these palaeo-features are present within the vicinity of the broader study area and development area for McTaggart PV3, as a result, the probability of finding fossils is low.

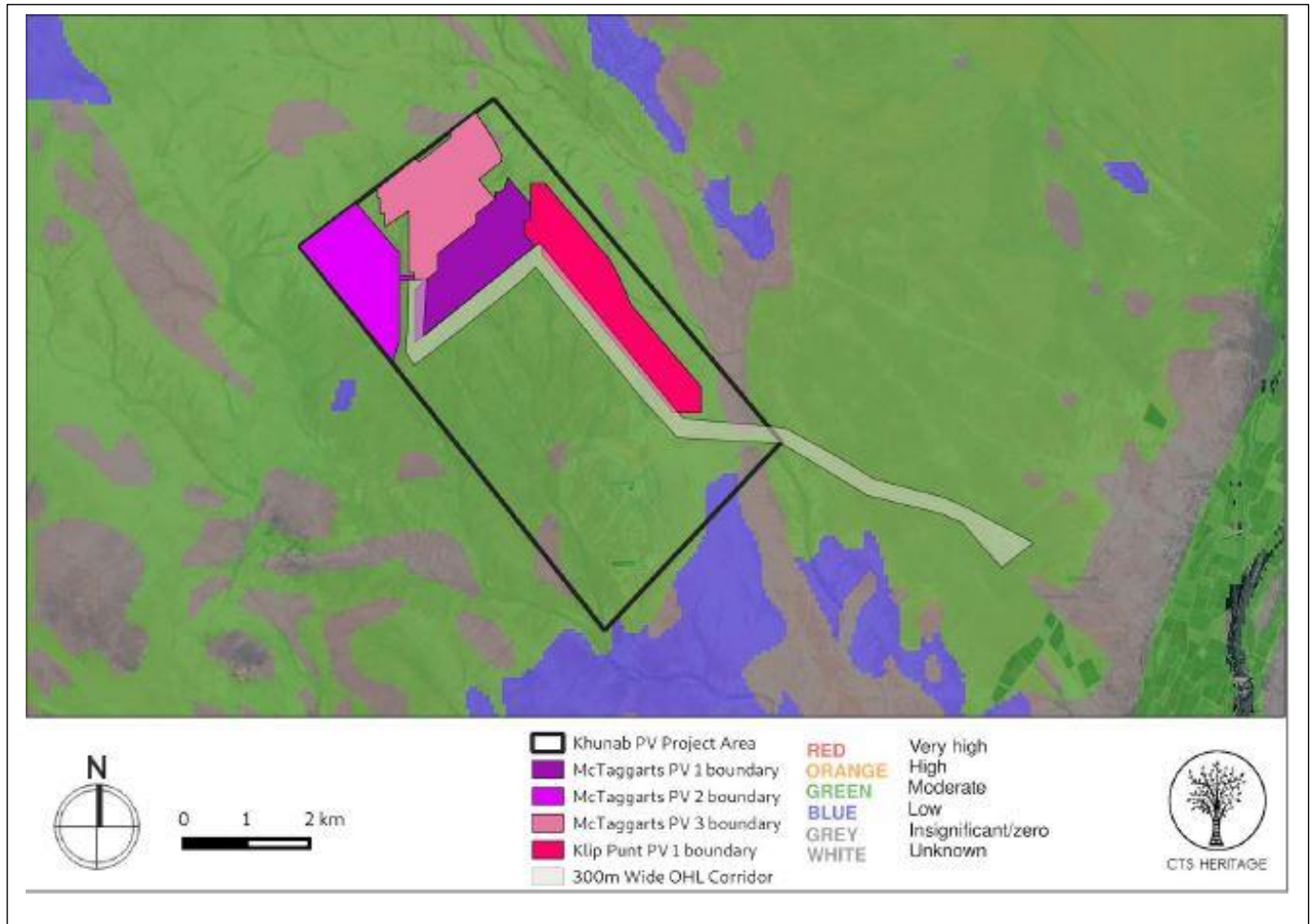


Figure 7.15: A palaeosensitivity map illustrating the location of the McTaggarts PV3 development area.

7.6. Visual Quality

The broader study area for McTaggarts PV3 is generally flat, consisting of valley depressions that are obvious along the N14 national road towards Keimoes. Numerous renewable energy developments have been developed and proposed within the vicinity of the broader study area, i.e. the Khi Solar One CSP facility and Sirius Solar PV One, etc.

Three (3) sensitive visual receptors have been identified for the development of McTaggarts PV3. The low number of the receptors is a result of the development being viewed in the context of the existing solar energy facilities within the vicinity of the broader study area, which include, the Khi Solar One CSP facility (which consists of a 160m high Solar Tower) and Sirius Solar PV One which is currently under construction.

» Area Receptors

Area receptors include minor urban settlement areas identified and located within the Orange River Corridor Landscape Character Area (LCA). The majority of the settlement areas relate to the agricultural use of the River. Furthermore, it is also likely that the residents of these settlements are predominantly focused on agriculture-based economic activities, and due to these settlements being located near the banks of the Orange River, it is therefore a possibility that views of McTaggarts PV3 will be difficult, particularly from the northern banks of the River.

» Linear Receptors

Linear receptors or infrastructure running adjacent to the broader study area include the N14 national road, the R359, the Lutzputs Road and the Upington – Kakamas Spur Railway. The N14 national and the R359 roads have substantial tourism significance; particularly the N14 national road, as it links the town of Upington with Kakamas, which is where the Augrabies National Park (a major tourist destination in the Province) is located. The Lutzputs Road is unsurfaced and runs approximately 3.2km to the north-east of the broader study area. This road is likely used by local residents in the area whereas the Upington – Kakamas Spur Railway is used for the transportation of goods.

» Point Receptors

Point receptors in the vicinity of the broader study area include individual homesteads that are located within the Orange River and the Plateau LCA. Based on field observations, it is unlikely that the homesteads located on the northern sections of the Orange River will have any views of McTaggarts PV3. It is, therefore, possible that homesteads located on the higher sections on the southern bank of the Orange River could have views of the proposed development. These, however, will be distant views, which will be softened by the extensive riparian vegetation present along the banks of the Orange River.

7.7 Social Profile

The social profile provides an indication of the specific social aspects within the area which will be relevant to the development of the McTaggarts PV3, and which may be affected with the development of the proposed project.

Within the vicinity of the development area for McTaggarts PV3, no sensitive social receptors are located. Social receptors that could possibly be affected by the development are local travellers making use of the Lutzputs Road located to the east of the development area. Other social receptors from the area are located to the south-east of the development area and include travellers making use of the N14 national road, the settlements of Kalksloot, Klippunt, Oranjevallei, Ses Brugge and Dyasons Klip, as well as, agricultural activities undertaken along the banks of the Orange River. As a result of the presence of other renewable energy projects being undertaken in the vicinity of the social receptors, the development of McTaggarts PV3 will, therefore, not introduce solar energy to the area or an additional land use. In addition, the distance of the development area from these social receptors also provides a buffer against direct social impacts subsequent to the development of the solar PV facility.

Table 7.2 provides a baseline summary of the social profile of the Kai !Garib LM and the Dawid Kruiper LM within which McTaggarts PV3 is proposed. The data presented in this section of the BA Report has been derived from the 2011 Census, the Local Government Handbook South Africa 2019, the Northern Cape Provincial Spatial Development Framework (PSDF) and the ZF Mgcawu DM, Kai !Garib and Dawid Kruiper LM IDPs.

Table 7.2: Baseline description of the social characteristics of the area proposed for McTaggarts PV3

Location characteristics

- » McTaggarts PV3 is proposed within the Northern Cape Province, which is South Africa's largest, but least populated Province.
- » The project is proposed within the Kai !Garib LM and the Dawid Kruiper LM of the ZF Mgcawu DM.
- » The Dawid Kruiper LM was established by the amalgamation of the Mier LM and //Khara Hais LM on 3 August 2016,

and covers an area of land 44 231km² in extent, formally making it the largest LM in South Africa.

- » The Kai !Garib LM is approximately 26 358km² in extent, equivalent to approximately one quarter (25.7%) of the ZF Mgcawu DM.

Population characteristics

- » Between 2001 and 2011 the Kai !Garib LM experienced a population growth rate of 1.2% per year.
- » Between 2001 and 2011 the Dawid Kruiper LM experienced a population growth rate of -1.8% per year.
- » The Kai !Garib LM is male dominated, with males comprising approximately 52.0% of the LM population. The ZF Mgcawu DM is also male dominated, with males comprising approximately 50.8% of the DM population.
- » The Dawid Kruiper LM is female dominated, with females comprising approximately 50.6% of the LM population, while the ZF Mgcawu DM is male dominated, with males comprising approximately 50.8% of the DM population.
- » Coloureds comprise the predominant population group within the Kai !Garib LM, Dawid Kruiper LM and ZF Mgcawu DM.
- » The Kai !Garib LM, Dawid Kruiper LM, ZF Mgcawu DM, and Northern Cape provincial, and South African national population age structures are all youth dominated. A considerable proportion of the respective populations therefore comprise individuals within the economically active population between the ages of 15 and 64 years of age

Economic, education and household characteristics

- » The Kai !Garib LM has a dependency ratio of 29.5, which is lower than the ZF Mgcawu DM (33.6), Northern Cape Province (35.8), and South Africa (34.5).
- » The Dawid Kruiper LM has a dependency ratio of 35.6, which correlates closely with the ZF Mgcawu DM (34.4), Northern Cape Province (35.8), and South Africa (34.5).
- » Education levels within the Kai !Garib LM are low with approximately 70.6% of the population aged 20 years and older who have received some form of schooling not having completed Grade 12 / Matric. This implies that the majority of the population can be expected to have a relatively low-skill level and would either require employment in low-skill sectors, or skills development opportunities in order to improve the skills level of the area.
- » Education levels within the Dawid Kruiper LM are low with approximately 58.3% of the population over 20 years of age not having completed Grade 12 / Matric. This means that the majority of the population can be expected to have a relatively low-skill level and would either require employment in low-skill sectors, or skills development opportunities in order to improve the skills level of the area.
- » The unemployment rate of the Kai !Garib LM (6.7%) is lower than that of the ZF Mgcawu DM (11.3%), and the percentage of economically inactive individuals within the Kai !Garib LM (31.3%) is also lower than that of the ZF Mgcawu DM (38.3%).
- » The unemployment rate of the Dawid Kruiper LM is only fractionally lower than that of the ZF Mgcawu DM (i.e. 11.9% for the LM and 11.3% for the DM), and the percentage of economically inactive individuals within the Dawid Kruiper LM is higher than in the ZF Mgcawu DM (i.e. 43.3% in the LM and 38.3% in the DM). This could have a negative impact in terms of the local human capital available for employment.
- » Household income levels within the Kai !Garib LM are very low, with approximately 84% falling within the poverty level (i.e. R0 – R38 400 per annum). The area can therefore be expected to have a high poverty level with associated social consequences such as not being able to pay for basic needs and services and poor living conditions.
- » Household income levels of the Dawid Kruiper LM are low within the area, with over half (54%) of falling within the poverty level (i.e. R0 – R38 400 per annum). The area can therefore be expected to have a high poverty level with associated social consequences such as not being able to pay for basic needs and services and poor living conditions.
- » The main economic sectors within the Kai !Garib LM include agriculture (51.8%), community and government services (15.9%), wholesale and retail trade (11.3%), finance services (7.6%), and manufacturing (5.1%).
- » The primary economic activities within the Dawid Kruiper LM comprise trade and retail as a result of the strong tourism and agricultural sectors.
- » As of 2011 there were a total of 22 260 households within the Kai !Garib LM. This is equivalent to 32.9% of the total number of households within the ZF Mgcawu DM (67 468), and 7.1% of the total number of households within Northern Cape Province (313 402).

- » The majority of households (56.3%) within the Kai !Garib LM comprise formal brick dwellings, while 1.7% comprise traditional dwellings, 4.3% comprise informal dwellings not in a backyard, and 0.4% comprise informal dwellings in a back yard.
- » The majority of households within the Dawid Kruiper LM comprise formal brick dwellings, with only a very small proportion (0.8%) comprising traditional dwellings.

Services

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

7.8 Site Accessibility

The Lutzputs Road (D3276) which will provide access to the development area is located off the N14, which is classified as a Class 1 Expressway. The N14 is a single carriage way with one lane per direction running in an east – west direction; whereas, the Lutzputs Road passes near the broader study area for McTaggart PV3 and will, therefore, allow direct access to the development area for the development. In addition, the Lutzputs Road is 8 – 10m wide and 6.5m at the intersection and/or crossing with the Spur Railway Line which located approximately 370m from the N14 national road intersection.

CHAPTER 8: ASSESSMENT OF POTENTIAL IMPACTS

This Chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect and cumulative) expected to be associated with the development of McTaggart PV3 and its associated infrastructure. This assessment has considered the construction of a PV facility with a contracted capacity of up to 75MW, within a development area of 260ha in extent. McTaggart PV3 will comprise the following key infrastructure and components:

- » Fixed-tilt or tracking solar PV panels with a maximum height of 3.5m;
- » Centralised inverter stations or string inverters;
- » A temporary laydown area;
- » Cabling between the panels, to be laid underground where practical;
- » A 22kV or 33kV/132kV on-site substation of up to 1ha in extent to facilitate the connection between the solar PV facility and the electricity grid;
- » An access road to the development area with a maximum width of 6m;
- » Internal access roads within the PV panel array area with a maximum width of 5m; and
- » Operation and maintenance buildings including a gate house and security building, control centre, offices, warehouses, a workshop and visitors centre.

The full extent of the broader study area was considered through the BA process by the independent specialists and the EAP. On-site sensitivities were identified through the review of existing information desk-top evaluations and field surveys. A development footprint for the PV facility within the development area was proposed by the proponent through consideration of the sensitive environmental features and areas identified following the commencement of the BA process. A layout for McTaggart PV3 was designed within the development area and avoids environmentally sensitive areas not considered to be suitable for development or infringement (refer to **Figure 8.1**). In addition, the layout for McTaggart PV3 is considered as least intrusive on the environment and most suitable for development within the area surrounding the broader study area.

The proposed development of McTaggart PV3 will comprise the following phases:

- » *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads; a temporary laydown area and facility infrastructure; construction of foundations involving excavations, the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for McTaggart PV3 is estimated at 12 – 18 months.
- » *Operation* – will include the operation of the solar PV energy facility and the generation of electricity, which will be fed into the national grid via the facility on-site substation and an overhead power line (assessed as part of a separate Application for Environmental Authorisation). The operation phase of McTaggart PV3 is expected to be approximately 20 years (with maintenance).

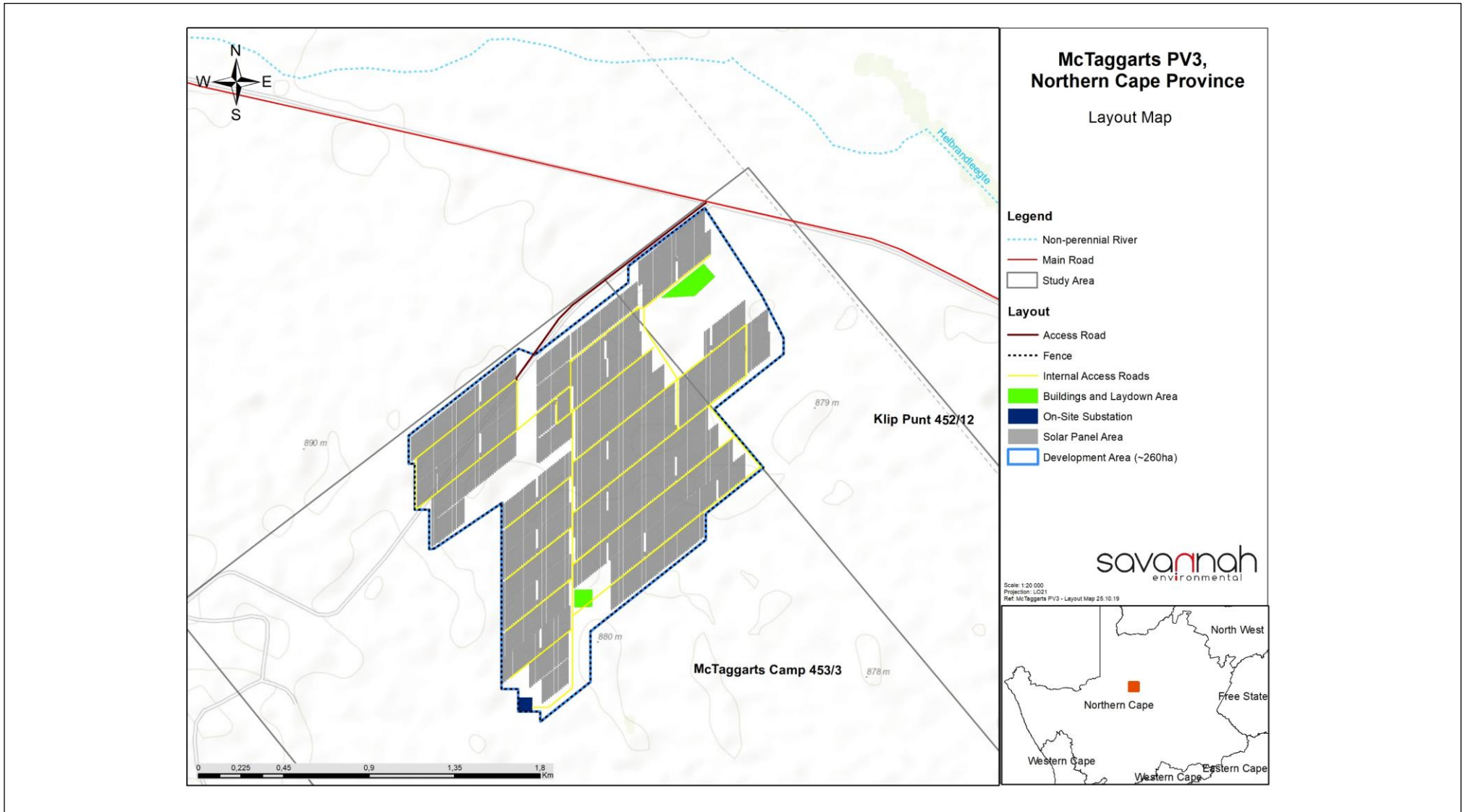


Figure 8.1: Map illustrating the McTaggarts PV3 layout (i.e. development footprint) located within the development area.

- » *Decommissioning* – depending on the economic viability of the solar PV facility, the length of the operation phase may be extended beyond a 20-year period. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the PV facility and the on-site substation, clearance of the relevant infrastructure at the PV panel area, and the on-site substation 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.

Environmental impacts associated with the pre-construction, construction (and decommissioning) of McTaggart PV3 will include, among others, habitat loss (for fauna and avifauna species); impacts on vegetation and protected plant species and habitat degradation as a result of erosion and alien plant species invasion; a reduced ability to meet conservation obligations and targets; and impacts on broad-scale biological resources. In addition, impacts anticipated for the operation phase of the solar PV facility, among others include, visual impacts, particularly, from the security lighting of the facility on night-time observers.

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

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

Requirement	Relevant Section
3(h)(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed, (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated.	The impacts and risk associated with the development of McTaggart PV3 including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, 8.9.3 and 8.10.3.
3(h)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The positive and negative impacts associated with the development of McTaggart PV3 are included in sections 8.3.2, 8.4.2, 8.5.2, 8.6.2, 8.7.2, 8.8.2, 8.9.2 and 8.10.2.
3(h)(viii) the possible mitigation measures that could be applied and the level of residual risk.	The mitigation measures that can be applied to the impacts associated with McTaggart PV3 are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, 8.9.3 and 8.10.3.
3(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	A description of all environmental impacts identified for McTaggart PV3 during the BA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, 8.9.3 and 8.10.3.
3(j) an assessment of each identified potentially	An assessment of each impact associated with the

Requirement	Relevant Section
significant impact and risk, including (i) cumulative impacts, (ii) the nature, significance and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.	development of McTaggart PV3, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, 8.9.3 and 8.10.3.
3(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMP.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in sections 8.3.3, 8.4.3, 8.5.3, 8.6.3, 8.7.3, 8.8.3, 8.9.3 and 8.10.3.

8.2. Quantification of Areas of Disturbance within the Development Area

Site-specific impacts associated with the construction and operation of McTaggart PV3 relate to site clearance activities that could impact protected and listed plant species (i.e. *Vachellia erioloba*), cause an increased risk of soil erosion as a result of the loss of vegetation cover. In order to quantitatively assess the impacts associated with the development of McTaggart PV3, it is necessary to consider the extent of the identified development area (i.e. 260ha) and the extent of the development footprint (i.e. 210ha) to be affected by the pre-construction and construction activities of the proposed solar PV facility.

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

The development and operation of McTaggart PV3 will have an impact on the ecological resources identified within the development area. These resources include vegetation, protected and listed plant species; fauna; habitat; conservation and broad-scale ecological processes.

A summary of the ecological impacts identified and the significance thereof for the proposed development are included below. Reference should be made to **Appendix D** for more detail.

8.3.1 Results of the Ecological Impact Assessment

The vegetation within the broader study area and development area is relatively homogenous, and there are no areas of open veld considered to be of a high sensitivity. Major sensitive features within the broader study area and the development area include the ephemeral drainage lines and minor washes. However, the larger drainage lines (refer to **Figure 8.2**) are associated with a significant riparian woody habitat which considered to be of a very high sensitivity. The poorly/less developed drainage lines are, however, associated with a high sensitivity. The very high sensitivity areas are considered unsuitable for development and apart from roads and other linear infrastructure which would need to traverse these features, they should be kept clear of major development. Development within the high sensitivity areas should be constrained as far as possible. Although some development in the high sensitivity areas is potentially acceptable, these areas are vulnerable to cumulative impact and so this should be restricted as much as possible to limit impacts to an acceptable level. Under the layouts provided for the assessment, the footprint in the high sensitivity areas has been significantly reduced and the assessed footprint and associated impact in the high sensitivity areas is considered acceptable. The minor washes

(refer to **figure 8.2**), are considered to be of a medium sensitivity and the riparian and surrounding habitats of a low sensitivity.

As a result of the presence of the drainage line within the McTaggarts PV3 development area (refer to **Figure 8.2**), the development footprint and layout of the solar PV facility has been split into two (2) sections, separated by the drainage line. In general, the layout proposed for the development of McTaggarts PV3 is considered acceptable from an ecological perspective and no impacts of a high significance are anticipated.

A sensitivity map illustrating sensitive ecological features identified for the development area are included in **Figure 8.2** below.

8.3.2 Description of Ecological Impacts

The following ecological impacts have been identified for the development of McTaggarts PV3.

Impacts on vegetation and protected plant species

Several protected plant species in terms of the National Forest Act (Act No. 84 of 1998) and the Northern Cape Nature Conservation Act (Act No. 9 of 2009) occur within the development area and may be impacted on by the development footprint of the solar PV facility. These plant species include, *Vachellia erioloba*, *Boscia albitrunca* and *Boscia foetida subsp. foetida*. The density of these species within the development area is low and none of the *Vachellia erioloba* and *Boscia albitrunca* species will be impacted by the proposed development footprint.

Site clearance activities during the construction phase will lead to the loss of habitat within the development area and development footprint.

Direct faunal impacts

Increased levels of intrusion (i.e. noise, human presence, etc.), pollution and disturbance during the construction phase will be detrimental to fauna. Sensitive and shy fauna will move away from the development area during the construction phase as a result of noise and human activities present. Slow moving faunal species would not be able to avoid construction activities and might be killed as a result. Therefore, some impact on fauna is likely to occur during the construction phase of McTaggarts PV3.

Habitat degradation due to erosion and alien plant invasion

Disturbance within the development footprint during the construction phase will leave the area vulnerable to erosion and alien plant invasion. In addition, this will also lead to the degradation of the local environment. Although, the disturbance will be mainly created during the construction phase of the proposed development, the major impacts will manifest during the operation phase of McTaggarts PV3.

Reduced ability to meet conservation obligations and targets

The loss of unprotected vegetation types on a cumulative basis from the areas surrounding the broader study area and the McTaggarts PV3 development area may impact on the country's ability to meet its

conservation targets. The development area identified for McTaggart PV3 is, however, not located within a National Protected Areas Expansion Strategy (NPAES)³⁶ Focus Area, indicating that it has not been identified as being of a high ecological significance for conservation expansion. The Kalahari Karroid Shrubland Vegetation Type is, however, relatively restricted for an arid area and is vulnerable to cumulative impacts. Therefore, this impact has been assessed for the proposed development, as well as, other renewable energy developments in the surrounding area which would also contribute to the cumulative impacts. Refer to Chapter 9 for more details on cumulative ecological impacts.

Impact on broad-scale ecological processes

Transformation of intact habitat due to the proposed development of McTaggart PV3 would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. These impacts have been assessed for McTaggart PV3 alone, as well as, on a cumulative basis considering other existing or proposed renewable energy developments in the surrounding area. Refer to Chapter 9 for more details on cumulative ecological impacts.

³⁶ Protected areas are areas of land or sea that are protected by law and managed mainly for biodiversity conservation: <https://www.environment.gov.za/documents/strategicdocuments/npaes>

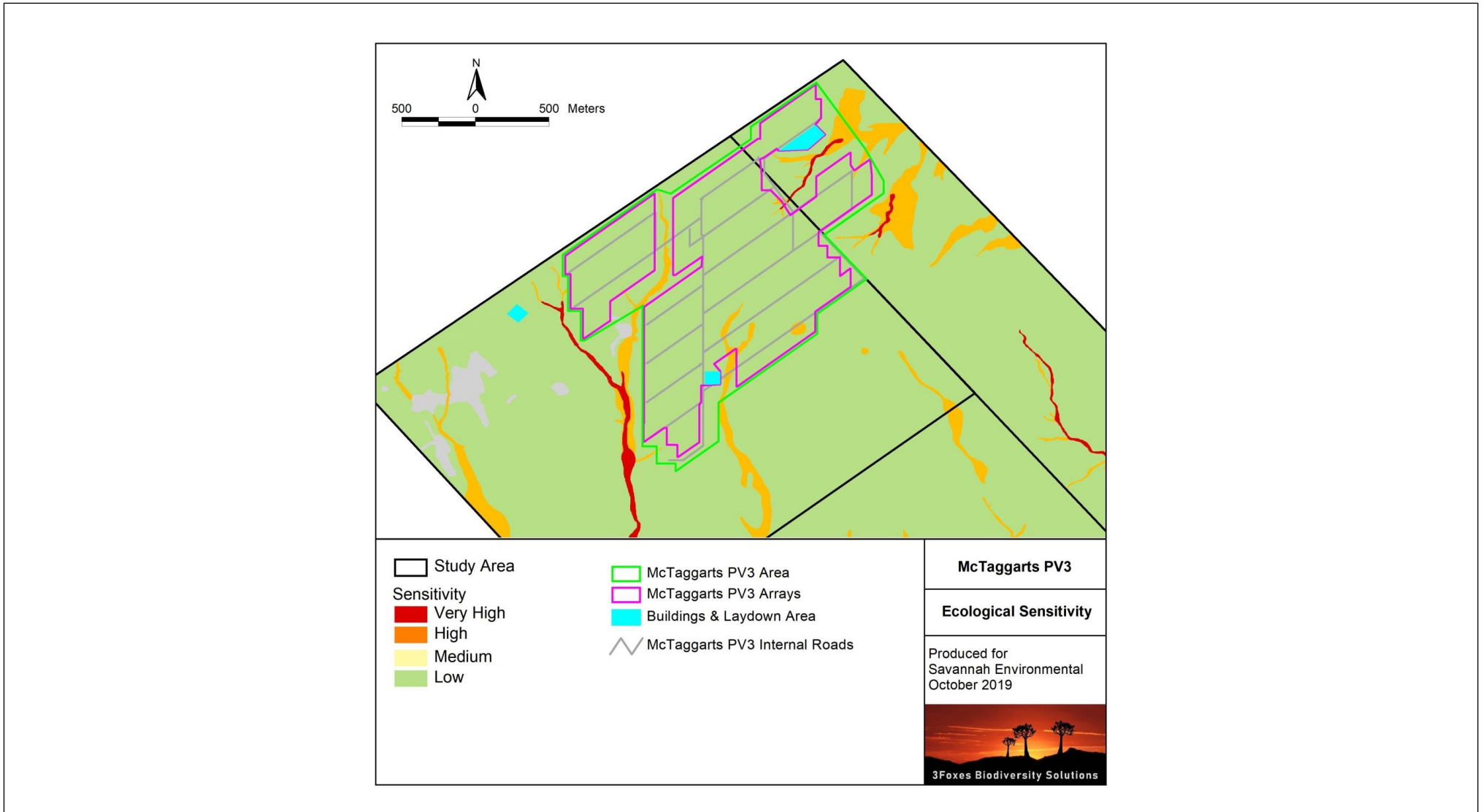


Figure 8.2: Ecological sensitivity map overlain with the McTaggarts PV3 layout

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

The impacts assessed below apply to the development area assessed for McTaggart PV3. Based on the proposed and assessed development footprint, which already avoids highly sensitive features, the significance of the impacts with the implementation of the recommended mitigation measures are medium to low, which is considered to be acceptable from an ecological perspective.

Construction Phase Impacts

Nature: <i>Impacts on vegetation and listed or protected plant species resulting from construction activities.</i>		
Impacts on vegetation will occur due to disturbance and vegetation clearing associated with the construction of the facility. In addition, it is likely that some loss of individuals of protected tree species will occur.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (4)	Low (3)
Probability	Definite (5)	Definite (5)
Significance	Medium (45)	Medium (40)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	This impact cannot be readily mitigated because the loss of vegetation is unavoidable and is a certain outcome of the development.	
Mitigation:		
<ul style="list-style-type: none"> » A pre-construction walk-through of the facility's final layout (i.e. development footprint) must be undertaken in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act (Act No. 9 of 2009) and DENC/DAFF permit conditions. » Search and rescue for identified species of concern must be undertaken before construction commences. » Vegetation clearing to commence only after the walk-through has been conducted and the necessary permits obtained. » Pre-construction environmental induction for all construction staff on site must be undertaken to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc. » The Environmental Officer (EO) to provide supervision and oversee the vegetation clearing activities within sensitive areas such as areas near the pans. » Vegetation clearing must be kept to a minimum. No unnecessary vegetation must be cleared. » All construction vehicles must adhere to clearly defined and demarcated roads. No off-road driving must be allowed outside of the construction area. » Temporary laydown areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use. 		
Residual Impacts:		
As the loss of currently intact vegetation is an unavoidable consequence of the development, the habitat loss associated with the development will result in a moderate residual impact even after mitigation and avoidance of more sensitive areas.		

Nature: Direct Faunal Impacts Due to Construction Activities of the facility

Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction. Due to noise and operation of heavy machinery, faunal disturbance will extend well beyond the footprint and extend into adjacent areas. This will however be transient and restricted to the construction phase.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low to Medium (5)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (32)	Low (28)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Although noise and disturbance generated at the site during construction are largely unavoidable, impacts such as those resulting from the presence of construction personnel at the site can be easily mitigated.	

Mitigation:

- » All personnel must undergo environmental induction with regards to fauna and, in particular, awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition.
- » Any fauna threatened by the construction activities must be removed to safety by an appropriately qualified person.
- » All construction vehicles must adhere to a low speed limit (40km/h for light vehicles and 30km/h for heavy vehicles) to avoid collisions with susceptible species such as snakes and tortoises.
- » All hazardous materials must be stored in the appropriate manner to prevent contamination of the development area. Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill.
- » If trenches need to be dug for electrical cabling, these must not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open must have places where there are soil ramps allowing fauna to escape the trench. Larger fauna can be excluded with barrier nets.

Residual Impacts:

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

Operation Phase Impacts

Nature: Faunal Impacts due to the operation of the facility

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

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To a large extent, but some low-level residual impact due to noise	

	and human disturbance during maintenance is likely.
Mitigation:	
<ul style="list-style-type: none"> » Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities must be removed to a safe location. » If the site must be lit at night for security purposes, this must be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects. » All hazardous materials must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site must be cleaned up in the appropriate manner as related to the nature of the spill. » All vehicles accessing the site must adhere to a low speed limit (40km/h max for light vehicles and 30km/h max for heavy vehicles) to avoid collisions with susceptible species such as snakes and tortoises. » If the facility must be fenced, then no electrified strands should be placed within 30cm of the ground as species such as tortoises are susceptible to electrocution from electric fences since they do not move away when electrocuted, but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands should be placed on the inside of the fence and not outside, as this is the case on the majority of already constructed PV plants. 	
Residual Impacts:	
Disturbance from maintenance activities will occur at a low level with the result that disturbance would be largely restricted to the site.	

Nature: <u>Habitat degradation due to erosion and Alien Plant Invasion</u>		
Disturbance created during the construction of the facility will leave the development area vulnerable to erosion and alien plant invasion for several years into the operation phase.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Low (4)	Low (3)
Probability	Likely (4)	Likely (3)
Significance	Medium (36)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation:		
<ul style="list-style-type: none"> » Erosion management within the development footprint must take place according to the Erosion Management Plan and Rehabilitation Plan. » Access roads should have run-off control features which redirects water flow and dissipate any energy in the water which may pose an erosion risk. » Regular monitoring for erosion during the operation phase to ensure that no erosion problems have developed as result of the disturbance, as per the Erosion Management and Rehabilitation Plans for the project. » All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. » There must be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs and succulents from the local area. » Alien management at the site must take place according to the Alien Invasive Management Plan. » Regular monitoring for alien plant proliferation during the operation phase must be undertaken to ensure that no erosion problems have developed as result of the disturbance, as per the Alien Management Plan for the project. » Woody alien plant species must be controlled on at least an annual basis using the appropriate alien control 		

techniques as determined by the species present.

Residual Impacts:

Some erosion and alien plant invasion are likely to occur even with the implementation of control measures but would have a low impact.

8.3.4 Implications for Project Implementation

Based on the proposed and assessed development footprint, which already avoids highly sensitive features, the significance of the impacts with the implementation of the recommended mitigation measures are medium to low, which is considered to be acceptable from an ecological perspective. From the outcomes of the ecological impact assessment undertaken, it is concluded that the solar PV facility and associated infrastructure can be developed with the implementation of the recommended mitigation measures. On-site mitigation is viewed as the most practical and appropriate action and viable options for reducing the overall impact of the development on these areas is detailed below:

- » A pre-construction walk-through of the final development footprint must be undertaken for species of conservation concern that would be affected and that can be translocated prior to the commencement of the construction phase.
- » Before construction commences individuals of listed species within the development footprint that would be affected, must be counted and marked and translocated, where deemed necessary by the ecologist conducting the pre-construction walk-through survey. Permits from the relevant national and provincial authorities, i.e. the DAFF and the Northern Cape DENC, must be obtained before the individuals are disturbed.
- » An open space management plan should be developed for the development footprint within the development area, which must include management of biodiversity within the affected areas, as well as that in the adjacent bushveld.
- » No electrified strands must be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences because they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands should be placed on the inside of the fence.

8.4. Assessment of Impacts on Avifauna

Based on the proposed and assessed development footprint of McTaggart PV3 and identified features of high significance, the significance of the impacts with the implementation of the recommended mitigation measures are assessed as medium to low, which is considered to be acceptable from an impact on avifauna 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

Important avian microhabitats play an integral role within the landscape, providing nesting, foraging and reproductive benefits to the local avifauna. In order to ensure that the development does not have a long-term negative impact on the local avifauna, it is important to delineate these avian microhabitats within the broader study area and development area. **Figure 8.3** was generated by integrating avian microhabitats present within the broader study area and development area, and avifaunal information collected during the spring (4 – 8 October 2018) and late summer (9 – 12 April 2019) field surveys.

The broader study area supports three (3) main avifaunal microhabitats, which are referred to as the plains, drainage lines and small pans. These three (3) habitats have marginally different sensitivities as a result of the subtle differences in the avifaunal assemblages that they support. As a result, these habitats have been classified as being of a medium, high and very high sensitivity and are described below.

The plains habitat is associated with a medium sensitivity. The habitat supports a combination of an open gravel and sandy plains habitat which contributes to the habitat diversity of the area. The plains habitat supports the Near-Threatened Karoo-Korhaan and the Kori-Bustard and the Endangered Ludwig's Bustard.

The riparian habitat of the drainage lines and small pans are unique and restricted within the broader study area. The habitat is associated with a denser vegetation; therefore, the development of the solar PV facility would result in much of the habitat and ecological functioning being lost. Therefore, where possible, buffer zones of 50 – 100m wide should be included around the habitat, since the preservation of the habitat associated with these features will also ensure adequate drainage of the broader study area during rainfall events. As a result, the riparian habitat associated with the drainage lines and small pans is of a high sensitivity (refer to **Figure 8.3**). In addition, the large drainage lines traversing the development area are considered to be of a very high sensitivity and should be excluded from development. Development within the high sensitivity areas should be constrained as far as possible. Although some development in the high sensitivity areas is potentially acceptable, these areas are vulnerable to cumulative impact and so this should be restricted as much as possible to limit impacts to an acceptable level. Under the layouts provided for the assessment, the footprint in the high sensitivity areas has been significantly reduced and the assessed footprint and associated impact in the high sensitivity areas is considered acceptable.

The proposed layout for McTaggart PV3 infringes slightly (refer to **Figure 8.3**), on the habitat for the Karoo Korhaan species identified along the eastern and north-eastern boundary of the broader study area. This area has been identified as a possible corridor for this species based on their consistent presence within the plain's habitat, which consists mainly of gravel substrate along the eastern section of the broader study area. This corridor for the korhaans does extend further to the east and north of the broader study area; therefore, this species is associated with a wider distribution. In addition, the total estimated extent of the contiguous habitat associated with the Karoo Korhaan is approximately 13 000ha, of which only 123ha will be impacted through the development of McTaggart PV3. Therefore, since the development of McTaggart PV3 will only result in 1% of the habitat being lost, this loss is considered as acceptable and of a minor significance. This may ensure that the species does not suffer a significant loss and would aid in ensuring habitat continuity with other tracks of habitat with similar gravel substrate. However, future renewable energy developments, particularly solar PVs within the vicinity of McTaggart PV3 should cumulatively take into consideration the distribution of the Karoo Korhaan in the surrounding environment and their association with the preferred habitat.

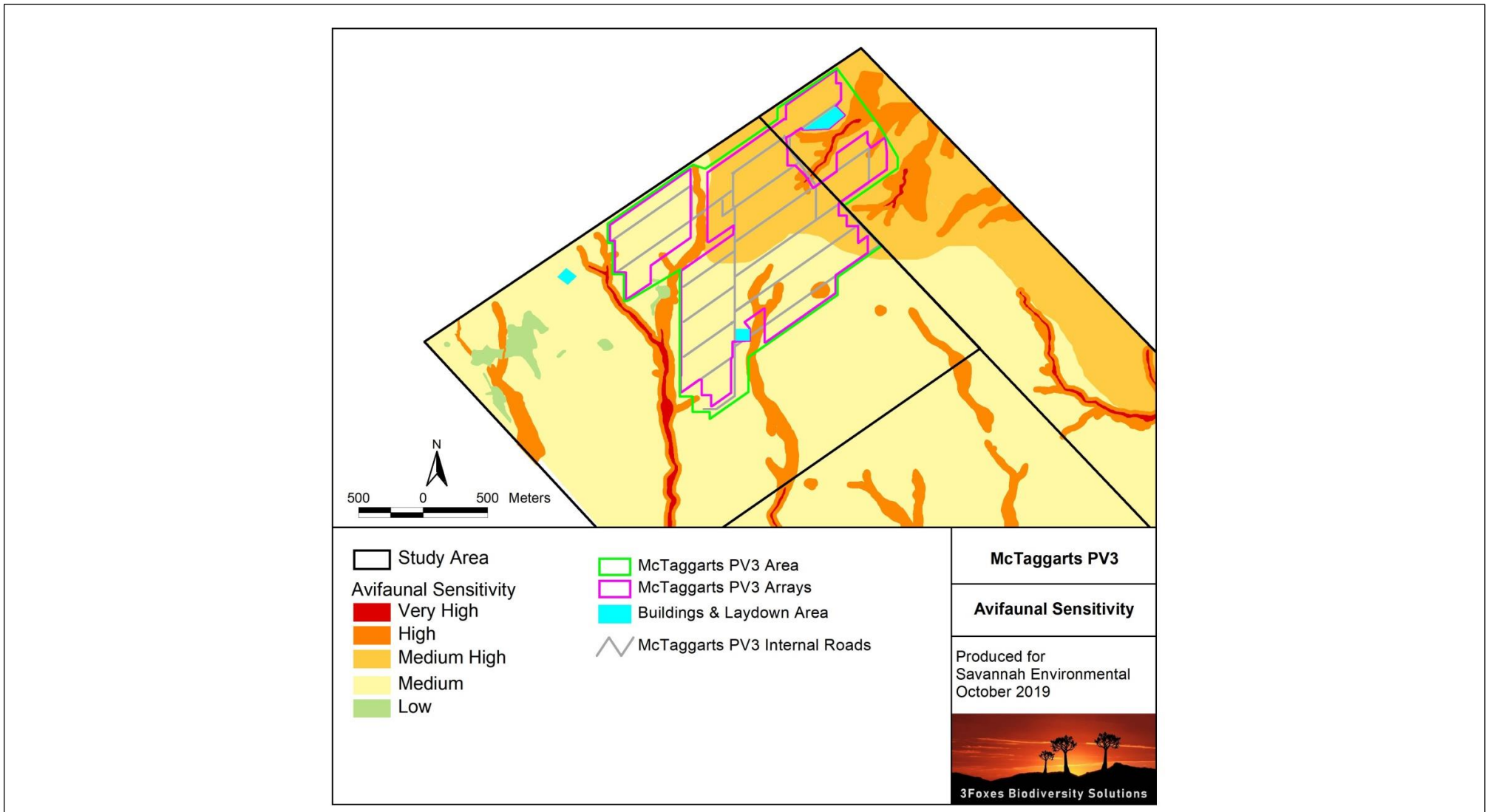


Figure 8.3: A map illustrating the avifaunal sensitivity within the McTaggarts PV3 development area overlain with the proposed layout.

8.4.2 Description of Avifaunal Impacts

Negative avifauna impacts anticipated to occur with the development of McTaggart PV3 include habitat loss and disturbance of small passerines, disturbance and collision risk of medium and large terrestrial birds and raptors.

» Habitat loss and disturbance of small passerines

For the smaller passerine species, the most important impacts will involve displacement from the area encompassed by the development footprint as a result of habitat destruction. The loss of habitat will be permanent while disturbance may be continuous during the operation phase of McTaggart PV3. Although numerous species will be impacted, all of these species have large distribution ranges and will, therefore, only experience population decline on a localised scale within the development footprint and immediate surroundings, and not on a regional or national scale. Some of the most abundant species that will be impacted and that are also common in the adjacent habitats include, the Spike-heeled Lark, Sabota Lark, Fawn-coloured Lark, Eastern Clapper Lark, Rufous-eared Warbler, Chat Flycatcher and the Black-chested Prinia. Disturbance impacts as a result of reflective solar PV panels is not likely to have a significant impact on these small species. Therefore, the impacts in general can be expected to be minor, as the smaller species are far less susceptible compared to the larger species.

» Habitat loss, disturbance and collision risk of medium terrestrial birds and raptors

Small to medium-sized non-passerines that may be impacted to some extent due to habitat loss and displacement include, resident raptors such as the Pale Chanting Goshawk and the terrestrial Namaqua Sandgrouse, Northern Black Korhaan, Double-banded Courser and most importantly, the Near-Threatened Karoo Korhaan. These species may be susceptible to collisions with associated infrastructure such as the PV panels, however, this not expected to have a major impact on most of these species. The Northern Black Korhaan and Karoo Korhaan may, however, be at more risk based on recent research depending on the type of perimeter fencing installed at the facility.

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

Construction Phase Impacts

Nature: <u>Habitat loss and disturbance due to vegetation clearing</u>		
Vegetation clearance which will be required during the construction phase for the placement of various infrastructure and components required for the solar PV facility will lead to the loss of habitat and inevitably displace the avifauna species from their habitat.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low to Moderate (5)
Probability	Definite (5)	Definite (5)
Significance	Medium (45)	Medium (40)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low

<p>Can impacts be mitigated?</p>	<p>This impact cannot be readily mitigated because the loss of habitat is unavoidable and is a definite outcome of the development. The significance of the impact can only be slightly reduced.</p>
<p>Mitigation:</p> <ul style="list-style-type: none"> » The placement of laydown areas within the footprint must avoid habitat loss and disturbance to adjoining areas. » The major drainage lines within the plain's habitat must be avoided where feasible, as these contribute to the habitat diversity. The south-eastern corner of Portion 12 of the Farm Klip Punt 452, which lies adjacent to the Khi Solar One CSP facility must be declared as a buffer zone between the Plant and the wooded drainage line to the east. » All building waste produced during the construction phase must be removed from the development area and be disposed of at a registered waste management facility. Similarly, all liquid wastes should be contained in appropriately sealed vessels/ponds within the development area and be disposed of at a designated waste management facility after use. Any liquid and chemical spills must be dealt with accordingly to avoid contamination of the environment. » Pre-construction environmental induction for all construction staff on site must be undertaken to ensure that basic environmental principles are adhered to, and awareness is created about not harming or hunting ground-dwelling species (e.g. bustards, korhaans, thick-knees and coursers), and owls, which are often persecuted out of superstition. » This induction must also include awareness regarding no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. » All construction vehicles must adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area. » All construction vehicles should adhere to a low speed limit (40km/h max for light vehicles and 30km/h max for heavy vehicles) to avoid collisions with susceptible species such nocturnal and crepuscular species (e.g. nightjars, thick-knees and owls) which sometimes forage or rest along roads. » Any avifauna threatened by the construction activities must be removed to safety by an Environmental Officer or any other suitably qualified person. » If holes or trenches need to be dug, these must not be left open for extended periods of time as terrestrial avifauna or their flightless young may fall in and become trapped in them. Holes must only be dug when they are equipped and must be used and filled shortly thereafter. » No construction activity must occur near active raptor nests. Should these be discovered, prior to or during the construction phase, and if there are active nests near construction areas, these should be reported to the ECO and be monitored until the birds have finished nesting and the fledglings have left the nest. » The perimeter fence around the facility must be designed with potential impacts on terrestrial avifauna in mind. Double-face designs where the inner electric fence is positioned within one (1) metre of the outer mesh fence may result in medium-sized non-passerine species colliding with either fence when trapped. Single-fence designs, whereby the electrical fencing component is attached to the inside of the mesh fence are considered preferable as terrestrial birds cannot be trapped between these components. 	
<p>Residual Impacts:</p> <p>As the loss of currently intact habitat is an unavoidable consequence of the development, the habitat loss associated with the development remains a residual impact even after mitigation and avoidance of more sensitive areas. The sensitivity of the affected habitat is, however, low and the overall residual impact on avifaunal habitat loss remains low.</p>	

Operation Phase Impacts

<p>Nature: <i>Collisions with PV panels, potential entrapment along perimeter fencing and disturbance due to traffic and night lighting</i></p> <p>Mortality among the avifauna may result due to direct collisions with PV panels or entrapment along the perimeter fence of the solar PV facility.</p>

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low to Moderate (5)	Low (4)
Probability	High Probable (4)	Probable (3)
Significance	Medium (40)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes, to a large degree, but it may be more difficult to prevent collisions and impacts related to the perimeter fence where double fencing is used as opposed to bird-friendly single-fencing.	

Mitigation:

- » All incidents of collision with panels must be recorded as meticulously as possible, including data related to the species involved, the exact location of collisions within the facility, and suspected cause of death. Post-construction monitoring with the aid of video surveillance should be considered, if there are high collision rates, as this will contribute towards understanding bird interactions with solar panels.
- » The major drainage lines must be avoided as far as possible, as well as, the majority of the area located on the southern eastern corner of the affected property which serves as a buffer between the Khi Solar One CSP facility and the wooded drainage line to the east.
- » If the site must be lit at night for security purposes, this must be done with downward-directed low ultraviolet (UV) type lights (such as most Light-emitting diodes (LEDs)), which do not attract insects. The use of lighting at night should be kept to a minimum, so as to not unnecessarily attract invertebrates to the facility and possibly their avian predators; therefore, minimising the number of birds flying over the facility at night.
- » If bird nests on the infrastructure of the facility and cannot be tolerated due to an operational risk of fire, electrical shorts, soiling of panels or other concerns, birds must be prevented from accessing the nest by using mesh or any other appropriate manner of excluding them. Birds must not be shot, poisoned or harmed, as this is not an effective control method and has negative ecological consequences. Birds with eggs or nestlings must be allowed to fledge their young where possible or be removed to a suitable area outside the development footprint of the solar PV facility.
- » If there are any persistent problems with avifauna, then an avifaunal specialist must be consulted for advice on further mitigation.
- » Any movements by vehicles or personnel must be limited to the footprint of the solar PV facility and other associated infrastructure, especially during routine maintenance procedures.
- » All vehicles accessing the site must adhere to a low speed limit (40km/h max for heavy vehicles and 30km/h max for light vehicles) to avoid collisions with susceptible species such as nocturnal and crepuscular (e.g. nightjars, thick-knees and owls) which sometimes forage or nest on roads at night.
- » Maintenance of the perimeter fencing must ensure that it minimises impacts on terrestrial species susceptible to entrapment between the fencing components, especially where double-fence designs are used (not recommended). If double-fence designs must be used, instead of preferred single-fence designs, the space between the outer mesh and inner electrical fence must be kept clear of vegetation which may attract terrestrial species to forage there, while also ensuring that there are no gaps/holes in these fences that will allow terrestrial birds to enter the space between the two fences.

Residual Impacts:

Although high rates of mortality due to collisions have not been recorded in South Africa, there is some risk that this may occur, in addition to some potential mortality associated with entrapment of terrestrial birds along perimeter fencing, especially for double-fence designs.

8.4.4 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of avifauna impacts associated with McTaggarts PV3 will be medium and low. From the outcomes of the avifauna impact assessment undertaken, it is concluded that the PV facility can be developed and impacts on avifauna be managed by taking the following into consideration:

- » The larger drainage lines and the area to the south-east of the broader study area must be excluded from development.
- » 50 -100m wide buffer zones, where possible must be implemented around the riparian habitat associated with the drainage lines.
- » All construction vehicles accessing the site must adhere to a low speed limit (40km/h max for heavy vehicles and 30km/h max for light vehicles) to avoid collisions with susceptible species such nocturnal and crepuscular species (e.g. nightjars, thick-knees and owls) which sometimes forage or rest along roads.
- » The perimeter fence must ensure that it fulfils the guidelines suggested by Visser (2016), to minimise impacts to Korhaans susceptible to entrapment between the fencing and electrical components of perimeter fencing.

8.5. Assessment of Impacts on Aquatic Resources

The significance of the impacts on aquatic resources expected with the development of McTaggarts PV3 have been assessed as being of a high and low significance with the implementation of the mitigation measures. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** for more details).

8.5.1 Results of the Aquatic Resources Impact Assessment

The broader study area for McTaggarts PV3 falls within the D73F catchment area which is associated with the Helbrandleegte and Helbrandkloofspruit aquatic systems in the Nama-Karoo region. These are short tributaries of the Orange River (located 10km south of the broader study area) and are largely ephemeral alluvial systems. The outcomes of the Aquatic Resources Impact Assessment (refer to **Appendix F**) have indicated that these alluvial systems are in a natural state, when compared to the Orange River reach which has modified floodplains and flows. The Aquatic Resources Impact Assessment further identified two (2) small depressions/pan wetlands (**Figure 8.4**) near the broader study area of McTaggarts PV3. The development area for McTaggarts PV3 is within 500m of one of the wetlands, whereas, the other wetland will be lost as a result of the development of the solar PV facility. Due to the size and the functionality of the pan located within the development footprint, the pan is not considered to be significant. Nevertheless, all the aquatic systems within the vicinity of the development area have been assigned a condition AB score, which indicated that they are largely intact and are of ecological significance. However, as a result of anthropogenic disturbance in the area, other impacts on the aquatic systems are prevalent, particularly downstream, where the Helbrandleegte and Helbrandkloofspruit systems confluence with the Orange River.

The Aquatic Resources Impact Assessment concluded that for activities occurring within 500m of the delineated drainage lines and wetlands, a water use authorisation from DWS will be required in terms of section 21(i) and (c) of the National Water Act (Act No. 36 of 1998).

8.5.2 Description of Aquatic Impacts

Negative impacts on aquatic resources anticipated to occur with the development of McTaggarts PV3 include the loss of major riparian systems, loss of wetlands, impact on minor drainage lines through physical disturbance, impact on riparian and wetland systems, an increase in sedimentation and erosion, and risks on the general aquatic environment as a result of water quality impacts.

» Loss of major riparian systems associated with the mainstem rivers, Helbrandleegte and Helbrandkloofspruit through physical disturbance within these high sensitivity features

The physical removal or disturbance of the narrow woody riparian zones, being replaced by engineered hard surfaces required for the development will result in a major loss of riparian systems for the mainstem drainage lines, Helbrandkloofspruit and Helbrandleegte downstream. This impact will, however, be localised, as the catchment area for these large drainage lines would remain intact since no new crossings have been proposed through these systems for the development. In addition, all of the remaining associated infrastructure required for the development of McTaggarts PV3 is located outside these mainstem systems.

» Loss of wetlands (pan/depressions)

The physical removal of narrow strips of the riparian zones will be required for one of the wetlands/pans identified within the development footprint for McTaggarts PV3. The small pan has a very small catchment, therefore, no significant changes to its hydrology are anticipated. However, several larger and more intact systems are located within the region and these will be avoided; therefore, this impact is considered acceptable.

» Impact on minor drainage lines through physical disturbance

The physical removal of narrow strips of woody riparian zones being replaced by hard engineered surfaces will alter the hydrological nature of the area, by increasing the surface run-off velocities, while reducing the potential for any run-off to infiltrate the soils. This impact, would, however, be localised, as the catchment area for these drainage lines would remain intact. Therefore, only small sections of the minor drainage lines within the development area for McTaggarts PV3 will be affected by the development of internal access roads and PV panels.

» Impact on all riparian and wetland systems through the possible increase in surface water run-off on riparian form and function through hydrological changes

The physical removal of narrow strips of the riparian zones associated with the wetlands/pans systems, and the replacement thereof by hard surfaces will alter the hydrological regime of the area by increasing the surface water run-off, while reducing the potential of any run-off to infiltrate soils.

» Increase in sedimentation and erosion within the development footprint.

The development of McTaggarts PV3 will leave some of the soil within the development footprint exposed to soil erosion and sedimentation which will be exacerbated by erosion agents, such as surface water run-off and wind.

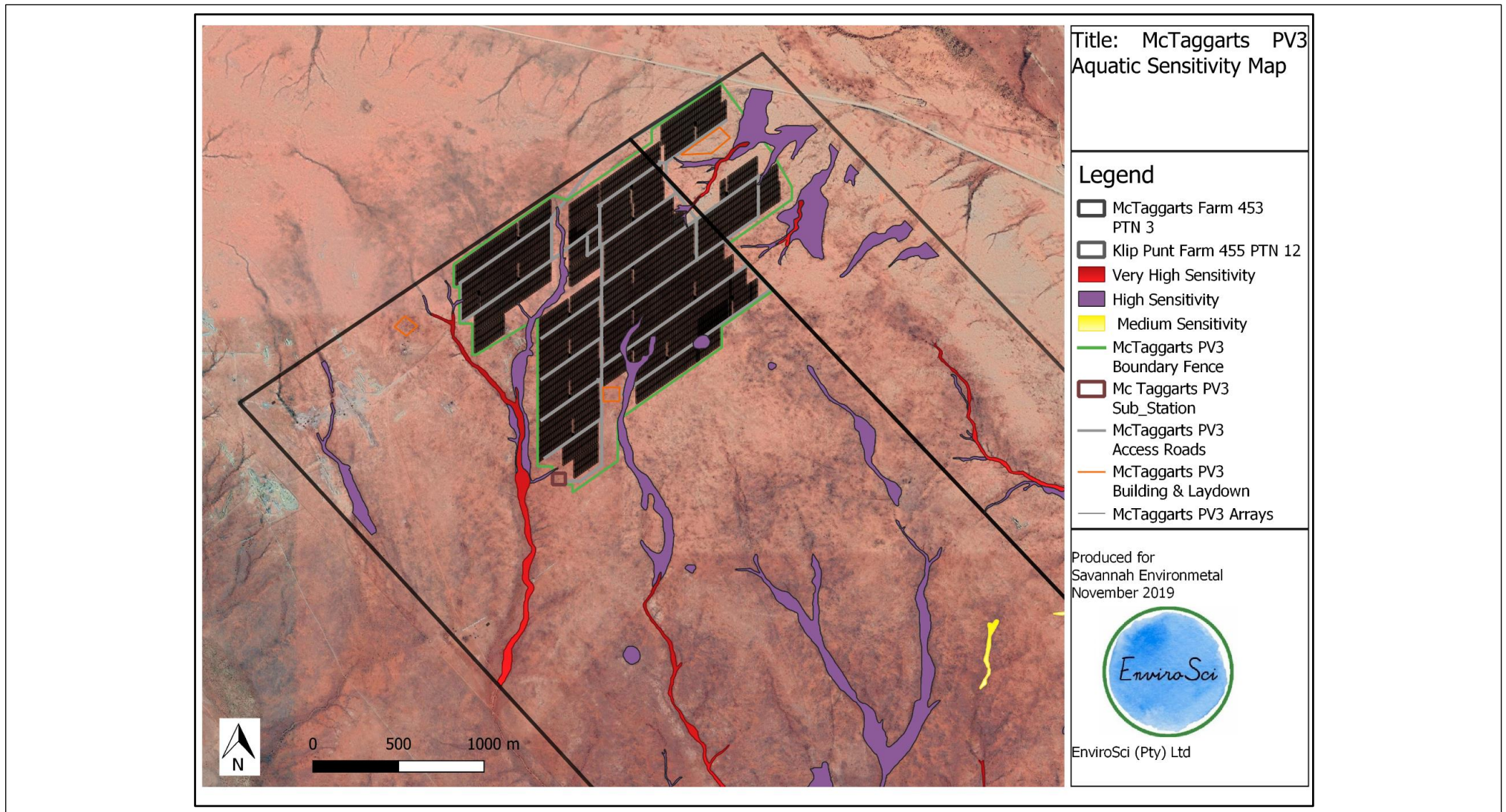


Figure 8.4: A map illustrating the delineated watercourses within the broader study area and development area for McTaggarts PV3

» *Impact on localised surface water quality*

During the construction phase and to a limited extent, also during the operation phase of McTaggart PV3, chemical pollutants (i.e. hydrocarbons from equipment and vehicles, cleaning products, cement powder, wet cement, shutter oil, etc.), associated with site-clearance machinery and construction activities could be washed downstream through the ephemeral systems in the area.

8.5.3 Impact tables summarising the significance of impacts on aquatic resources during construction and operation (with and without mitigation)

Construction and Operation Phase Impacts

Nature: *Loss of major riparian systems associated with the mainstem rivers, Helbrandleegte and Helbrandkloofspruit through physical disturbance.*

The physical removal or disturbance of the narrow woody riparian zones being replaced by hard engineered surfaces will have an impact; however, it will be localised as a large portion of the affected properties and the Helbrandleegte-Helbrandkloofspruit catchment area would remain intact with no new crossings proposed for the development on these systems. In addition, the associated infrastructure (i.e. temporary laydown area, office and maintenance buildings) is located outside these mainstem systems, therefore, only the alluvia watercourses and/or drainage lines within the development footprint will be affected by the development of internal access roads.

	Without mitigation	With mitigation
Extent	High (3)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (7)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	High (70)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

The most significant form of mitigation would be to select development options that contain no aquatic features; however, the proposed layout for McTaggart PV3 has been developed to avoid the important mainstem systems, thus requiring only crossings within alluvial watercourses and drainage lines demarcated to be a low/medium sensitivity and is, therefore, considered to be an acceptable infringement and loss of the features or sections thereof.

The following measures must be implemented:

- » Vegetation clearing must occur in a phased manner in accordance with the construction programme to minimise erosion and/run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Suitable dust and erosion mitigation measures must be included in the Environmental Management Programme to mitigate against these impacts.
- » All construction materials, including fuels and oil must be stored in demarcated areas that are contained within berms/bunds to avoid the spread of contamination and possible leaks. Washing and cleaning of equipment must also be done within bunded areas to trap any cement and/or hazardous substances and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is, therefore, recommended that all construction camps, lay down areas, batching plants or areas and any stores should be located more than 50m from any demarcated watercourses, as the only allowable infrastructure would be the PV panel mounting structures which will span the demarcated watercourses, i.e. the footings will be outside of these areas.

- » An Environmental Officer (EO) with a good understanding of the local flora must be appointed prior to the construction phase of the development. The EO, in consultation with the Environmental Control Officer (ECO), must make clear recommendations with regards to the re-vegetation of the newly completed/disturbed areas along aquatic features, using selected species detailed in the Aquatic Resources Impact Assessment Report (**Appendix F**) assisted by a suitably qualified person, where possible.
- » All alien plant re-growth must be monitored, and should these alien plants re-occur, these plants must be re-eradicated. The scale of the development does not warrant the use of a Landscape Architect or Contractor.
- » A comprehensive rehabilitation plan must be implemented from the commencement of the project to ensure a net benefit to the environment within all areas that will remain undisturbed but were affected during the construction phase. This should form part of the recommended walk down as part of the EMPr.

Residual Impacts:

Possible impact on the remaining catchment due to changes in run-off characteristics in the development area.

Nature: Loss of wetlands within the development area

Physical removal or disturbance will be required for one of the observed pans. This very small pan has a localised catchment therefore significant changes to its hydrology are anticipated. However, several larger and more intact systems are located within the region and these will be avoided therefore this impact is considered acceptable.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (8)	High (8)
Probability	Definite (5)	Definite (5)
Significance	High (65)	High (65)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

The most significant form of mitigation would be to avoid this system completely; however, due to the size and functionality of the pan, as well as, the avoidance of the larger and more intact systems, this impact is considered to be acceptable provided the following mitigation measures are adhered to:

- » Vegetation clearing must occur in a phased manner in accordance with the construction programme to minimise erosion and/run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Suitable dust and erosion mitigation measures must be included in the EMPr to mitigate against these impacts.
- » All construction materials including fuels and oil must be stored in demarcated areas that are contained within berms/bunds to avoid the spread of any contamination or leak. The washing and cleaning of equipment must also be done within berms/bunds in order to trap hazardous substances and to prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly to any channel (i.e. drainage line); therefore, all construction camps, laydown areas, batching plants or any stores must be located more than 50m from any demarcated drainage line.
- » An Environmental Officer (EO) with a good understanding of the local flora must be appointed prior to the construction phase of the development. The EO, in consultation with the Environmental Control Officer (ECO), must make clear recommendations with regards to the re-vegetation of the newly completed/disturbed areas along aquatic features, using selected species detailed in the Aquatic Resources Impact Assessment Report (**Appendix F**) assisted by a suitably qualified person, where possible.
- » All alien plant re-growth must be monitored, and should these alien plants reoccur, they should be re-eradicated.
- » A comprehensive rehabilitation plan must be implemented from the project onset to ensure a net benefit to the

environment within all areas that will remain undisturbed but were affected during the construction phase.

Residual Impacts:

Possible impact on the remaining catchment area due to change in run-off characteristics within the development area.

Nature: *Impact on the alluvial watercourses (high sensitivity) and the minor drainage lines (moderate sensitivity) through physical disturbance*

The physical removal of narrow strips of woody riparian zones being replaced by hard engineered surfaces will alter the hydrological nature of the area, by increasing the surface run-off velocities, while reducing the potential for any run-off to infiltrate the soils. This impact would however be localised, as it is intended that the PV panels and mounting structures traverse the watercourses and will not be placed within the watercourse, i.e. span the watercourses which will reduce the proposed impacts.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	Medium (45)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes.	

Mitigation:

The most significant form of mitigation would be to select a development area which contains no drainage lines. The proposed layout for the development of McTaggart PV3 (refer to **Figure 8.4**) avoids the important aquatic systems, therefore requiring only crossings or footprints within the minor drainage lines, which is considered to be an acceptable infringement and loss of the features or sections thereof. It is however recommended that the substation be repositioned to avoid these areas (specifically the associated buffer area), to minimise any loss of these areas.

- » Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or erosion which will lead to sedimentation in the lower portions of the catchment area. Therefore, suitable dust and erosion mitigation measures must be included in the EMPr (**Appendix M**) to mitigate against these potential impacts.

Residual Impacts:

Diversion of run-off away from the downstream systems is unlikely to occur as the annual rainfall figure in the region are generally low.

Nature: *Impact on all riparian and wetland systems through the possible increase in surface water run-off on riparian form and function through hydrological changes.*

Increase in hard surface areas, and roads that require stormwater management will increase through the concentration of surface water flows that could result in localised changes to flows (volume) that would result in form and function changes within the riparian systems, which are currently ephemeral, i.e. riparian systems species composition changes, which then results in habitat change / loss.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Low (2)

Probability	Definite (5)	Probable (3)
Significance	Medium (35)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Any stormwater within the development area must be handled in suitable manner, i.e. separate clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, trap sediments and reduce flow velocities (e.g. water used when washing the panels) (refer to Appendix G of the EMPr). » The development must capture and recycle any form of run-off created by the daily operations. This would minimise the amount of water required by the development, but also serve to limit the downstream impacts of the riparian systems through an increase in run-off, a scenario which these systems are currently unaccustomed to. 		
Residual Impacts:		
Possible impact on the remaining catchment area as a result of changes in run-off characteristics in the development area.		

Nature: Increase in sedimentation and erosion within the development footprint

An increase in hard surface structures (including roads) that require stormwater management will increase through the concentration of surface water flows. These higher volume flows, with increase velocity will result in downstream erosion and sedimentation.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Low (1)
Probability	Definite (5)	Probable (3)
Significance	Medium (35)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Any stormwater within the development area must be handled in suitable manner, i.e. separate clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, trap sediments and reduce flow velocities (e.g. water used when washing the panels). » Suitable stormwater management features with erosion control measures must be installed in areas where concentrated flows are anticipated (Appendix G of the EMPr). 		
Residual Impacts:		
During flood events, the unstable banks (eroded areas) and sediment bars (sedimentation downstream) already deposited downstream.		

Nature: Impact on localised surface water quality

During the construction phase and to a limited extent, also during the operation phase of McTaggart PV3, chemical pollutants (i.e. hydrocarbons from equipment and vehicles, cleaning products, cement powder, wet cement, shutter oil, etc.), associated with site-clearance machinery and construction activities could be washed downstream through the ephemeral systems in the area. It is however recommended that the substation be repositioned to avoid these areas, to minimise any loss of these areas.

	Without mitigation	With mitigation
Extent	Site (2)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Definite (5)	Probable (3)
Significance	Medium (35)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> » Reposition the substation location into more suitable areas from an aquatic perspective. » Strict use and management of all hazardous materials on site. » Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.) » Containment of all contaminated water by means of careful run-off management on-site. » Appropriate ablution facilities must be provided for construction workers during the construction and operation phase of the solar PV facility. » Strict control over the behaviour of construction workers. » Appropriate waste management. » Working protocols incorporating pollution control measures (including approved method statements by the Contractor), must be clearly set out in the EMPr for the project and be strictly enforced. 		
<p>Residual Impacts:</p> <p>Residual impacts will be negligible after appropriate mitigation.</p>		

8.5.4 Implications for project implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of aquatic impacts associated with McTaggart PV3 will be high, medium and low. From the outcomes of the Aquatic Resources Impact Assessment undertaken, it is concluded that the PV facility can be developed and impacts on aquatic resources be managed by taking the following into consideration:

- » Reposition the on-site facility substation location into more suitable areas from an aquatic perspective.
- » Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment, and suitable dust and erosion control mitigation measures should be included in the EMPr.
- » All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination / leaks. Washing and cleaning of equipment should also be done in berms or bunds, to trap any cement / hazardous substances and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is, therefore, suggested that all construction camps, lay down areas, batching plants or areas and any stores should be located more than 50m from any demarcated watercourse.
- » An EO with a good understanding of the local flora must be appointed during the construction phase. The EO, in consultation with the ECO, must make clear recommendations with regards to the re-vegetation of the newly completed/disturbed areas along aquatic features, using selected species detailed in the Aquatic Resources Impact Assessment Report (refer to **Appendix F**) assisted by a suitably qualified person, where possible.

- » All alien plant re-growth must be monitored, and should these alien plants reoccur, the plants should be re-eradicated.
- » A comprehensive rehabilitation plan must be implemented from the project onset within watercourse areas (including of buffers) to ensure a net benefit to the aquatic environment. This should form part of the suggested walk down as part of the final EMPr preparation.

8.6. Assessment of Impacts on Soils, Land Types and Agriculture Potential

The significance of the negative impacts on soil, land types and agricultural potential expected with the development of McTaggarts PV3 has been assessed as medium and low with the implementation of the mitigation measures. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G** for more details).

8.6.1 Results of the Soil, Agriculture Potential and Land Type Impact Assessment

The majority of the extent of the development area is located Ae10 land type and consists of a mixture of shallow Mispah soils, as well as, shallow red apedal soil profiles underlain by limestone (either soft or hard pan carbonate horizons).

In line with the newly launched land capability³⁷ classification systems released by DAFF, the entire development area for McTaggarts PV3 is considered to have a very low to low land capability (Class 4) which is an indication that the development area is only suitable for animal grazing and not dryland crop production. The grazing capacity³⁸ of the veld in the development area is 30 – 40ha per large stock animal; however, when this is converted to small stock units (8 – 10ha per small stock unit), it indicates that the development area can support 26 – 32 heads of sheep for grazing purposes. Sheep farming is regarded as a viable and long-term land use but is restricted by drought conditions and/or overstocking/exceeding the grazing capacity. The McTaggarts PV3 development area, including the proposed main access roads has a limited to no suitability for rained crop production. The data gathered during the two (2) day field-based survey indicated that the area has a very low to low land capability and is better suited for grazing. No infrastructure or alternative irrigation water supply is present within the development area for McTaggarts PV3.

Taking into consideration the baseline data and the findings of the two-day field-based survey, the development area for McTaggarts PV3 is associated with a low sensitivity (refer to **Figure 8.5**). Although the shallow soil profiles in the area have a limited grazing capacity, the development of McTaggarts PV3 and other renewable energy projects within the greater Upington area will have a minimal negative effect on the agricultural economy of the region.

³⁷ The extent to which land can meet the needs of one or more uses under defined conditions of management.

³⁸ The grazing capacity of a specified area for domestic herbivores is given either in large animal unit per hectare or in hectares per large animal unit.

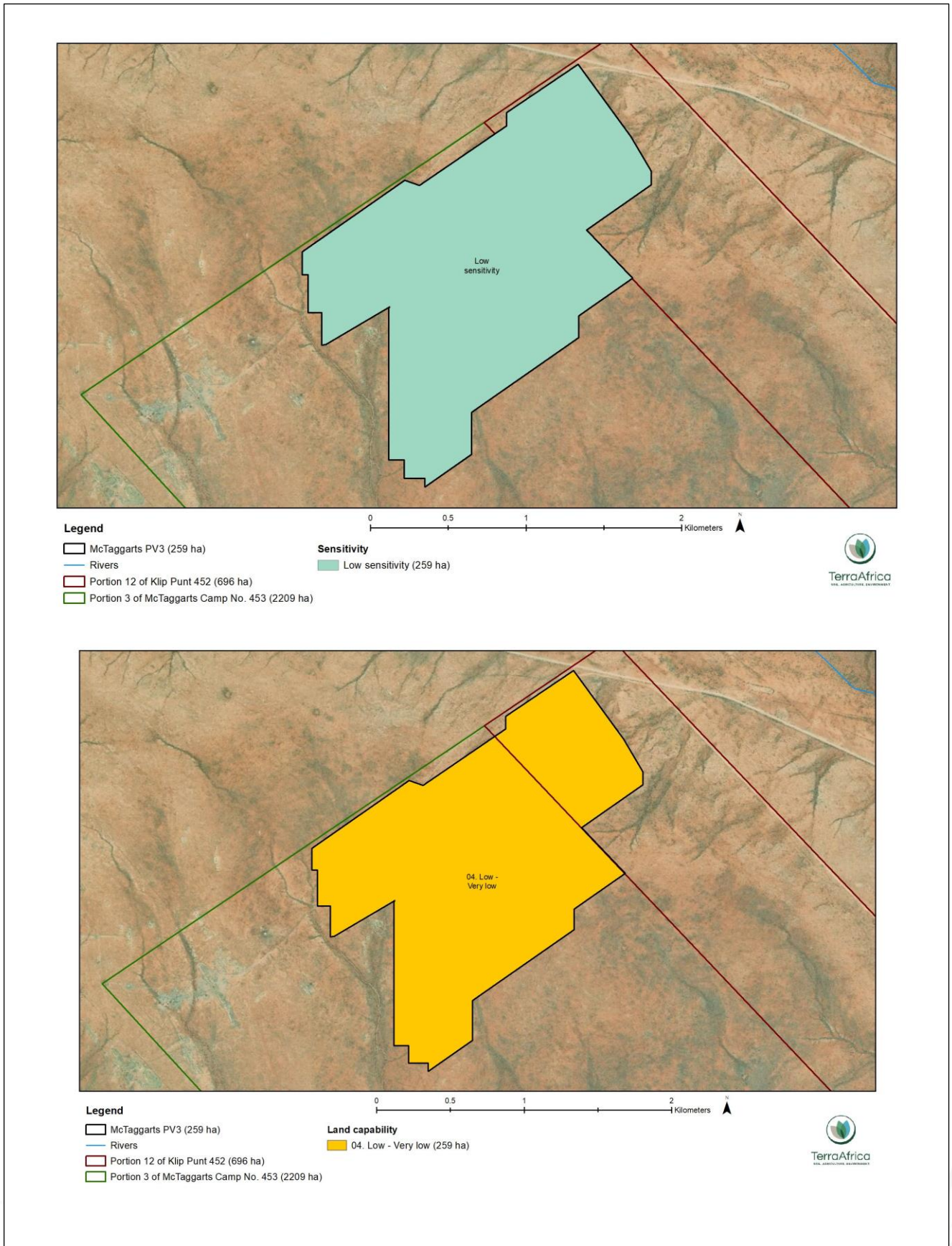


Figure 8.5: Maps illustrating the low land sensitivity and capability of the development area for McTaggarts PV3.

8.6.2 Description of Soil, Agriculture Potential and Land Type Impacts

Considering the characteristics of the development area proposed for McTaggarts PV3 in terms of the soil, agricultural potential and land type the following impacts are expected to occur.

» Soil erosion and chemical pollution

Soil erosion is anticipated due to slope and vegetation clearance. The impact of soil erosion is both direct and indirect. Direct impacts include the reduction in soil quality which results from the loss of nutrient-rich upper layers of the soil and the reduced water-holding capacity of severely eroded soils. The off-site indirect impacts of soil erosion include the disruption of riparian ecosystems and sedimentation. Furthermore, the development will also require the use and storage of dangerous substances during the construction and operation phases. This impact will be located within the development footprint of McTaggarts PV3 subject to the implementation of the mitigation measures.

» Impact on current land capability

In areas of permanent changes, such as roads and the erection of infrastructure, rock spoil material discards site and topsoil stockpiles, the current land capability and land use of the development area will be lost completely. This impact will also be localised within the development footprint of McTaggarts PV3 subject to the implementation of the mitigation measures.

8.6.3 Impact tables summarising the significance of impacts on soil, agriculture potential and land types during construction and operation (with and without mitigation)

Construction and Operation Phase Impacts

Nature: <u>Susceptibility to soil erosion due to construction and operation of McTaggarts PV3</u>		
The construction of McTaggarts PV3 and the associated infrastructure will require the clearing and levelling of a limited area of land. The clearing and levelling will create disturbance and potentially increase the susceptibility of the disturbed areas to soil erosion.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint; » Avoid unnecessary land clearance; » Soil stockpiles must be dampened with dust suppressant or equivalent; » Soil stockpiles must be located away from any waterway or preferential water flow path in the landscape, to 		

<p>minimise soil erosion from these;</p> <ul style="list-style-type: none"> » Geo-textiles must be used to stabilise soil stockpiles and uncovered soil surfaces during the construction phase to serve as a sediment trap to contain as much; » The Stormwater Management Plan (SWMP), should provide for a drainage system sufficiently designed to prevent surface water run-off from the solar PV panels to cause soil erosion; » Where discharge of rainwater on roads will be channelled directly into the natural environment, the application of diffuse flow measures must be included in the design; and » Re-vegetate cleared areas as soon as possible after construction activities.
<p>Residual Impacts: The residual impact from the construction and operation of McTaggarts PV3 on the susceptibility to erosion will be negligible.</p>

<p>Nature: <u>Chemical pollution due to the construction and operation of the McTaggarts PV3 facility</u></p> <p>Spillages of hydrocarbons from machinery and vehicles during the construction phase will have an impact on the properties of the soil within the development footprint for McTaggarts PV3. In addition, the improper disposal of effluent, particularly of ablution facilities will also have an impact on the properties of the soil within the development area.</p>		
	Without mitigation	With mitigation
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Medium (36)	Low (14)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> » High level maintenance must be undertaken on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills. » Impermeable and bunded surfaces must be used for storage tanks and to park vehicles on; » Site surface water and wash water must be contained and treated before reuse or discharge from site; » Spills of fuel and lubricants from vehicles and equipment must be contained using a drip tray with plastic sheeting filled with absorbent material; » Spill kits should be available on site and should be serviced regularly; » Waste disposal at the construction site and during operations must be avoided by separating, trucking out and the recycling of waste; » Potentially contaminating fluids and other wastes must be contained in containers stored on hard surface levels in bunded locations; and » Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately by trained staff with the correct equipment and protocols outlined in the EMPr. 		
<p>Residual Impacts: The residual impact from the construction and operation of the proposed project will be low to negligible.</p>		

<p>Nature: <u>Loss of land capability as a result of the McTaggarts PV3 facility</u></p> <p>The land capability of the development area will be lost as a result of the construction activities associated with the development. The loss of land capability will be attributed to, the removal of vegetation, undertaking of earthworks,</p>
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and the construction of access roads and the PV panel area.		
	Without mitigation	With mitigation
Extent	Local (1)	Low (1)
Duration	Permanent (3)	Permanent (3)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (4)	Probable (4)
Significance	Medium (40)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
» Keep the development footprint as small as possible.		
Residual Impacts:		
The residual impact from the construction and operation of the proposed project will be of low significance.		

8.6.4 Implications for Project Implementation

With the implementation of the mitigation measures by the developer, contractors and operational staff, the significance of the soil, agriculture potential and land type impacts associated with McTaggart PV3 will be medium and low. From the outcomes of the soil, land type and agricultural potential impact assessment, it is concluded that the PV facility can be developed, and the impacts be managed by taking the following into consideration:

- » Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint.
- » Stockpiles must be dampened with a dust suppressant or equivalent;
- » Soil stockpiles must be located away from waterways or preferential flow paths within the development footprint or minimise soil erosion;
- » Geo-textiles must be used to stabilise soil stockpiles and uncovered soil surfaces during the construction phase and to serve as a sediment trap to contain as much soil as possible that might erode away; and
- » Cleared areas should be revegetated as soon as possible after construction has been completed.

8.7. Assessment of Impacts on Heritage and Palaeontological Resources

The significance of the negative impact on heritage and palaeontological resources expected within the development area have been assessed as low since no significant heritage resources were identified within the development area for McTaggart PV3. In addition, the development area is also within an area of low palaeosensitivity. The potential impact and its relative significance are summarised below (refer to **Appendix H** for more details).

8.7.1 Results of the Heritage and Palaeontological Impact Assessment

During the archaeological field assessment Stone Age and historical archaeological resources (refer to **Figure 8.6**) were identified within the McTaggart PV3 development footprint, however these resources are not considered to be conservation worthy as they are widely scattered and have no associated contextual material. No formal or informal graves were identified within the development area of the proposed project.

No significant heritage resources were identified within the development footprint of McTaggarts PV3. The Stone Age occurrences identified consist of isolated finds, and low-density ex-situ surface scatters containing predominantly Middle Stone Age (MSA) material, with a few incidences of Early and Later Stone Age lithics. Over 90% of the lithics recorded consist of flakes, cores, chunks and debris, with three hollow scrapers, two bifacial scrapers, a punch and blades. However, the material is too scattered to be connected to knapping sites, and no evidence of concurrent human occupation was identified in associated with the lithics. The identified archaeological materials are therefore of low significance, as the archaeological sample is small and without context, and therefore of little scientific value. These Stone Age heritage finds are not considered to be conservation-worthy, and the sites have been sufficiently recorded and no further action is required.

Several occurrences of archaeological surface material dating to the 19th and early 20th century were also recorded. These included two (2) Martini-Henry bullet casings dating between 1870 and the turn of the century. The area within the vicinity of the development area is well known for conflict between the British forces and the Koranna people who lived on the Orange River islands. The area was also actively monitored by the Cape Colonial Police from the 1890s to the 1900s, during the Anglo-Boer War. Therefore, although the spent cartridges are an exciting find, they are of little scientific value, since they are without context and are only a small sample. Therefore, these heritage finds are not considered conservation worthy, which means that they have been sufficiently recorded and no further action is required from the proponent.

From a palaeontological perspective, within the broader study area, the Gordonia Formation rests on calcretes or on pre-Kalahari bedrock. The sands can be up to 30m thick with frequently occurring linear dunes that have been stabilised by vegetation.

Based on the nature of the project, surface activities may impact on fossil heritage if preserved within the development footprint. The geological structures suggest that the rocks are either igneous and much too old to contain fossils or are alluvial and aeolian sands. The Gordonia Formation alluvial and aeolian sands are young and have been transported so are unlikely to preserve any fossils. Only if palaeo-pans or palaeo-channels are present is there a small chance of finding fossils. However, none have been recorded and the geological maps and satellite imagery do not indicate the presence of such features within the development footprint. Therefore, the potential impact to fossil heritage resources is low (refer to **Figure 8.7**).

Based on the specialist experience and the lack of any previously recorded fossils from the broader study area, it is extremely unlikely that any fossils would be preserved in the loose Quaternary Sands. There is a very small chance that fossils may occur in the adjacent shales of the early Permian Vryheid Formation. However, the development footprint lies on the Gordonia Formation dune and aeolian sands and the impact to significant palaeontological resources is unlikely.

8.7.2 Description of Heritage and Palaeontological Impacts

The development of McTaggarts PV3 will not have a negative impact on the heritage resources found within the vicinity of the development area and broader study area. The identified lithic and historical material identified is of a low significance and although these resources may be destroyed during the construction phase, the impact is inconsequential. In addition, it is also extremely unlikely that any fossils would be preserved within the area. There is, however, a chance that fossils may occur in adjacent shales

of the early Permian Vryheid Formation and as such, a Chance Fossil Find Protocol should be added to the EMPr.

It must be noted that a possible grave site was identified outside of the development footprint for McTaggarts PV3 (**Figure 8.6**). This site has however been mapped incorrectly on SAHRIS and it is confirmed by the specialist that the site nowhere near the development area or development footprint of McTaggarts PV3.

8.7.3 Impact table summarising the significance of the impact on heritage and palaeontological resources

Nature: <i>Impact to archaeological resources located within the development area.</i>		
No heritage resources of a high significance were identified during the field-based survey of the development area of McTaggarts PV3.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (5)	Long-term (5)
Magnitude	Low (2)	Low (1)
Probability	Improbable (1)	Probable (3)
Significance	Low (8)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	N/A	
Mitigation:		
» No mitigation measures required		
Residual Impacts:		
Should any significant resources be impacted, residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.		

Nature: <i>Impact to palaeontological resources located within the development area.</i>		
No palaeontological resources of a high significance were identified during the field-based survey of the development area of McTaggarts PV3.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (5)	Long-term (5)
Magnitude	Low (2)	Low (1)
Probability	Improbable (1)	Probable (3)
Significance	Low (8)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
» A Chance Find Protocol must be added to the EMPr		
Residual Impacts:		
Should any significant resources be impacted, residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.		

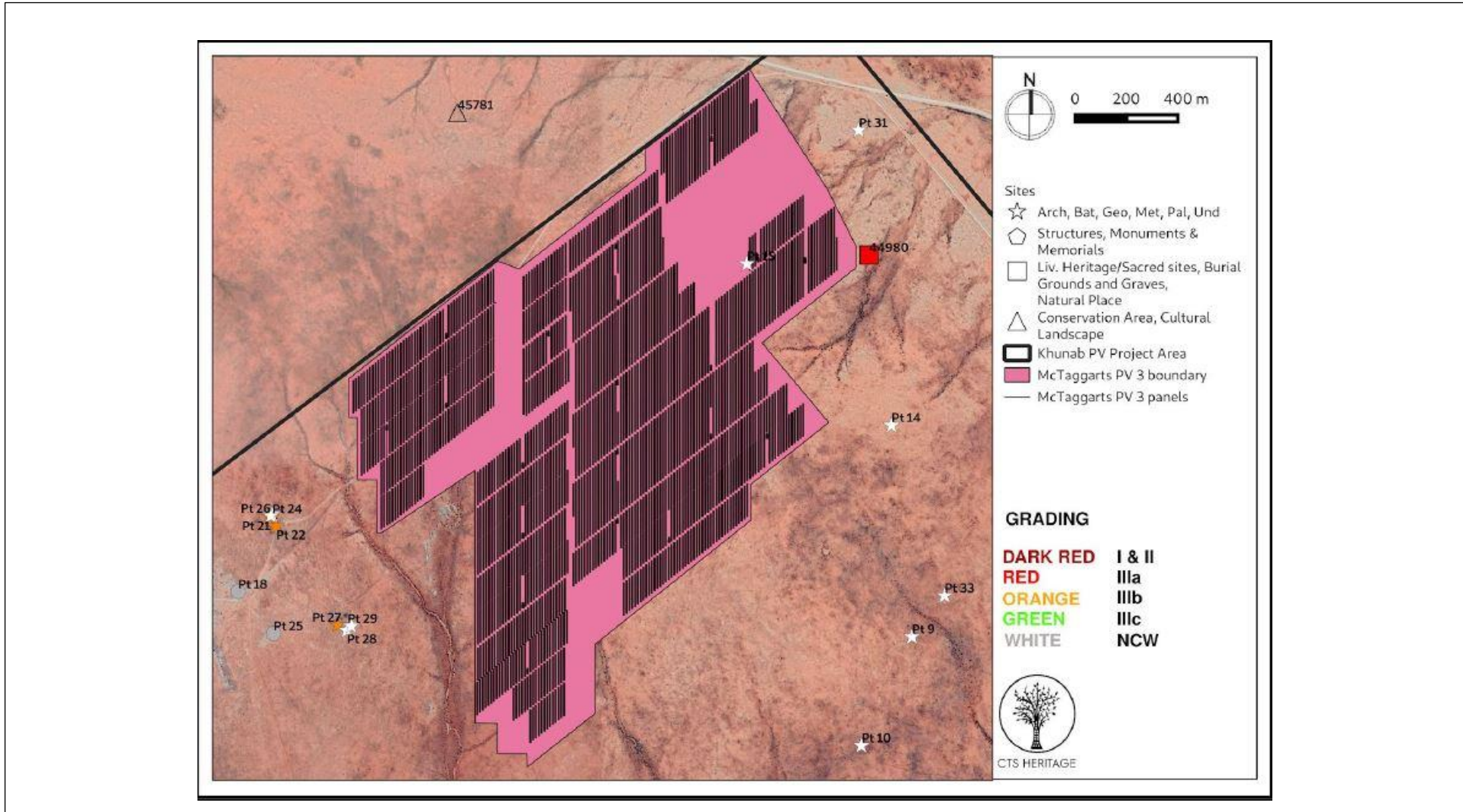


Figure 8.6: A map illustrating the heritage sites identified within the broader study area and development area of McTaggart PV3. All sites are graded as not being conservation worthy, as a result of their small sample size and lack of archaeological context which offers minimal scientific value.

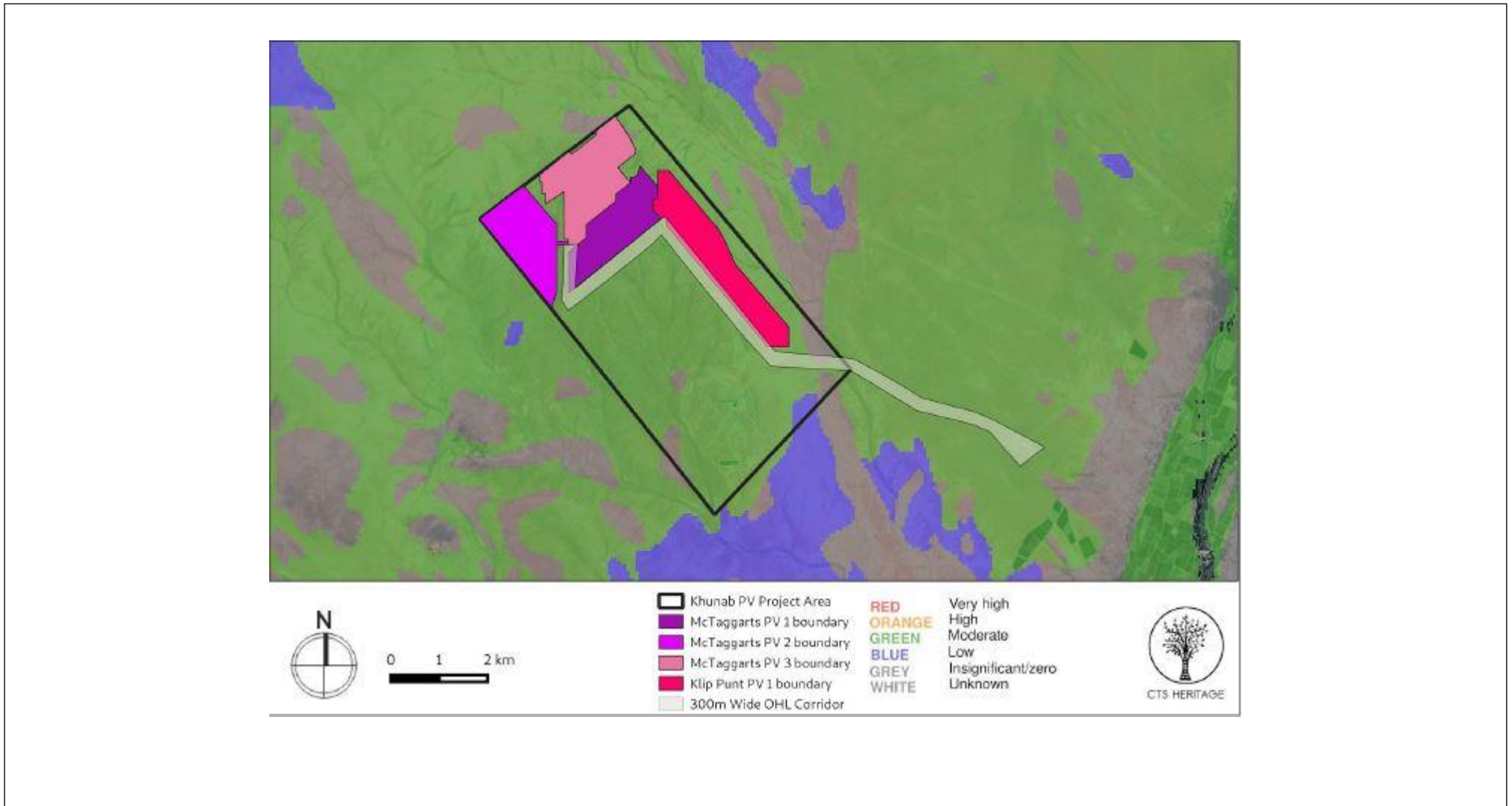


Figure 8.7: A map illustrating the location of McTaggarts PV3 within an area of moderate palaeo-sensitivity.

8.7.4 Implications on Project Implementation

The development of McTaggart PV3 will not have a negative impact on the heritage resources situated within the development footprint area. The identified lithic and historic material (refer to **Figure 8.6**) is of a low significance. Although these resources may be destroyed during the construction phase, the impact is inconsequential. Based on the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the Gordonia Formation (**Figure 8.7**). Furthermore, there is also a small chance that fossils may occur in the adjacent shales of the Vryheid Formation; therefore, a Chance Find Protocol and/or Procedure should be included to the EMPr and implemented should any discoveries be made.

8.8. Assessment of Visual Impacts

Negative impacts on visual receptors will occur during the undertaking of construction activities and the operation of McTaggart PV3. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H** for more details).

8.8.1 Results of the Visual Impact Assessment

McTaggart PV3 is anticipated to have a low visual impact on observers travelling along the N14 national road, the R359 and on the local homesteads and settlement areas within a 11.3km radius. The development will, however, have a medium visual impact on observers travelling along the Lutzputs Road. The probability of the impact occurring on observers travelling along the Lutzputs Road will be reduced, as McTaggart PV3 will be viewed in the context of the Khi Solar One CSP facility, where the power tower and heliostat field will be visible. In addition, the construction activities currently underway within the Remaining Extent of the Farm Tungsten Lodge 638, where Sirius One is located will also be visible from this road which adds to the industrial features located within the landscape.

The closest homestead to the broader study area is located approximately 4.6km away. Therefore, based on the Zone of Theoretical Visibility (ZTV)³⁹ analysis (refer to **Figure 8.8**), McTaggart PV3 is unlikely to be visible from this receptor. The ZTV also indicates that the development will not be visible from all the other local homesteads that have been identified within the vicinity of the broader study area. To this end, the ZTV analysis indicates that a section of the Lutzputs Road, both to the north, east and north-east of the broader study area could be potentially affected by glare. However, as a result of the limited number of observers using this road, the glare impact on the Lutzputs Road is unlikely to be of a high significance, whilst the impact of glare on the Upington International Airport was also assessed to be of improbable and of a low significance.

The visual receptors identified within the vicinity of the broader study area and development area likely to be impacted on by the development of McTaggart PV3 include the following:

³⁹ A Zone of Theoretical Visibility (ZTV), also known as the Zone of Visual Influence (ZVI), is a computer-generated tool used to identify the likely (or theoretical) extent of the visibility of a development.

» Area Receptors

Include the minor urban settlement areas that are located within the Orange River Corridor Landscape Character Area (LCA)⁴⁰. From the site visit, it appears that the majority of the settlement areas related to agricultural use of the River Valley. In addition, it is also likely that residents of these minor settlement areas are predominantly focused on agricultural production. As these settlement areas are located within the Orange River LCA, it is also likely that views of McTaggart PV3, particularly from the northern side of the Valley will be difficult as a result of vegetation screening views of the development which may be possible from the Orange River Valley;

» Linear Receptors

Linear receptors or routes through the area include the N14 national road, the R359 road, the Lutzputs Road and the Upington – Kakamas Spur Railway Line. Both the N14 and the R359 roads are of tourism significance; however, the N14 national road is the most significant as it links Upington with Kakamas, which is where the Augrabies National Park is located. The Lutzputs Road is an unsurfaced road that runs approximately 3.2km to the north-east of the broader study area for McTaggart PV3. This road is likely to be mainly used by local people, whereas the Upington – Kakamas Sur Railway Line is used for the transportation goods;

» Point Receptors

Point receptors include individual homesteads that are located within the Orange River LCA and the Plateau LCA. From the site visit, it is unlikely that settlements on the northern side of the Orange River will have views over McTaggart PV3. It is, however, possible that settlements on the higher sections, particularly on the southern side of the Valley could have views of the development. These will, however, be distant views and are likely to be softened by the vegetation on the fringes of the Orange River Valley.

8.8.2 Description of the Visual Impacts

Visual impacts associated with the development of McTaggart PV3 include the following:

- » A change in the character and sense of place of the landscape setting;
- » A change in the character of the landscape as seen from the N14;
- » A change in the character of the landscape as seen from the R359;
- » A change in the character of the landscape as seen from the Lutzputs Road;
- » A change in the character of the landscape as seen from the local homesteads and settlement areas in the area; and
- » Impacts from glare and lighting, particularly during the operation of the facility at night for night-time observers.

⁴⁰ Landscape Character Areas (LCAs) are defined as, 'single unique areas which are the discrete geographical areas of a particular landscape type.

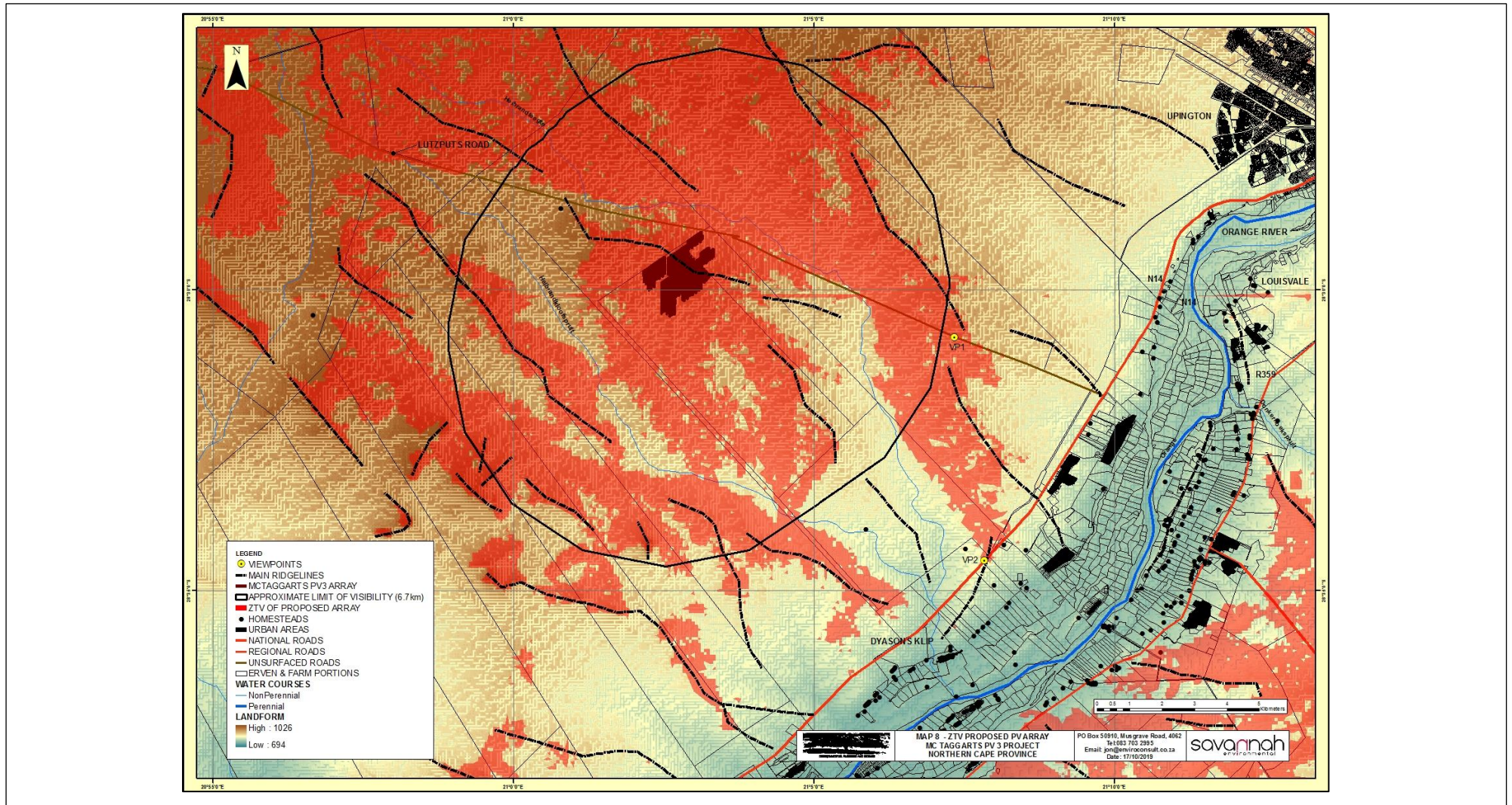


Figure 8.8: A map showing the Zone of Theoretical Visibility of McTaggart PV3. The map illustrates the potential theoretical visibility of the project within the surrounding landscape on the basis of the topography of the area surrounding the broader study area.

8.8.3 Impact tables summarising the significance of the visual impacts

Construction, Operation and Decommissioning Phases

Nature: *A change in the character and sense of place of the landscape setting*

McTaggarts PV3 is located within an arid plateau landscape area which is within approximately 12km from the closest section of the verdant Orange River Corridor. The difference between these landscape areas is marked with the semi-desert plateau contrasting strongly with the green arable landscape of the Orange River Valley. The ZTV analysis indicates that McTaggarts PV3 is unlikely to be visible from the Orange River Valley; therefore, the proposed development is unlikely to have a major impact on this LCA, however, it may be visible from the upper sections of the valley slopes. Therefore, from these areas, vegetation generally softens or screens views.

	Without mitigation	With mitigation
Extent	Orange River LCA Site and immediate surroundings (2) Plateau LCA Site and immediate surroundings (2)	Orange River LCA Site and immediate surroundings (2) Plateau LCA Site and immediate surroundings (2)
Duration	Orange River LCA Long-term (4) Plateau LCA Long-term (4)	Orange River LCA Long-term (4) Plateau LCA Long-term (4)
Magnitude	Orange River LCA Small (0) Plateau LCA Minor (2)	Orange River LCA Small (0) Plateau LCA Small to minor (1)
Probability	Orange River LCA Very improbable (1) Plateau LCA Probable (3)	Orange River LCA Very Improbable (1) Plateau LCA Probable (3)
Significance	Orange River LCA Low (6) Plateau LCA Low (24)	Orange River LCA Low (6) Plateau LCA Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	The components of the proposed development can be dismantled and removed at the end of the operation phase. There will, therefore, be no irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, impacts on both LCAs can be mitigated; however, due to the low level of impact the mitigation will not have a significantly affect the assessed level of impact.	
Mitigation: Planning:		

- » Plan levels to minimise earthworks to ensure that levels are not elevated;
 - » Plan to maintain the height of structures as low as possible.
 - » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.
- Operation:
- » Reinststate any areas of vegetation that have been disturbed during construction.
 - » Remove all temporary works.
 - » Monitor rehabilitation areas post-construction and implement remedial actions.
 - » Minimise disturbance and maintain existing vegetation as far as possible both within and surrounding the development area.
- Decommissioning:
- » Remove infrastructure not required for the post-decommissioning use of the site; and
 - » Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Residual Risks:

The residual risk relates to loss of natural vegetation cover being obvious following the decommissioning of the development. Therefore, it is critical that effective rehabilitation measures are implemented during this phase.

Nature: A change in the character of the landscape as seen from the N14 national road

The ZTV analysis indicates that views of McTaggart PV3 and the associated infrastructure will be limited to short sections of this road of approximately 1km of this road and at a distance of 11km. The proposed development will also be viewed in the context of the Khi Solar One CSP facility, as well as, Sirius Solar PV One which at the time of the reporting was under construction. Therefore, it is unlikely that McTaggart PV3 will be obvious from this road.

	Without mitigation	With mitigation
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Small (0)	Small (0)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	Low (6)	Low (6)
Status (positive or negative)	Given that the surrounding area is developing as a renewable energy development zone, it is possible that some stakeholders will see the development in a positive light. For those visiting the area for its natural attributes, and for residents whose view is affected, the change is likely to be seen as a Negative Impact .	Negative
Reversibility	High	High
Irreplaceable loss of resources?	The components of the proposed development can be dismantled and removed at the end of the operation phase. There will, therefore, be no irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, the impacts can be mitigated; however, due to the low level of impact, this will not significantly affect the assessed level of impact.	

Mitigation:

Planning:

- » Plan levels to minimise earthworks to ensure that levels are not elevated;

- » Plan to maintain the height of structures as low as possible.
 - » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.
- Operation:
- » Reinststate any areas of vegetation that have been disturbed during construction.
 - » Remove all temporary works.
 - » Monitor rehabilitation areas post-construction and implement remedial actions.
 - » Minimise disturbance and maintain existing vegetation as far as possible both within and surrounding the development area.
- Decommissioning:
- » Remove infrastructure not required for the post-decommissioning use of the site; and
 - » Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Residual Risks:

The residual risk relates to loss of natural vegetation cover being obvious following the decommissioning of the development. Therefore, it is critical that effective rehabilitation measures are implemented during this phase.

Nature: A change in the character of the landscape as seen from the R359 road

The ZTV analysis indicates that the proposed development could be visible in small sections of this road in the vicinity of Louisvale. If the development is visible, it will be seen in the context of and behind the Khi Solar One CSP facility, as well as, the Sirius Solar PV One development which at the time of the reporting was under construction.

Given that the project will be seen at a distance of approximately 16km and behind other closer existing renewable energy projects, it is highly unlikely that McTaggart PV3 will be visually obvious.

	Without mitigation	With mitigation
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Small (0)	Small (0)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	Low (6)	Low (6)
Status (positive or negative)	<p>Given that the surrounding area is developing as a renewable energy development zone, it is possible that some stakeholders will see the development in a positive light.</p> <p>For those visiting the area for its natural attributes, and for residents whose view is affected, the change is likely to be seen as a negative impact, however, due to the distance and likely screening and as a result of the small sections of the development being visible, these will be seen in the context of the existing renewable solar energy projects in the area, the change in the view is likely to be seen as a neutral impact.</p>	Neutral
Reversibility	High	High

Irreplaceable loss of resources?	The components of the proposed development can be dismantled and removed at the end of the operation phase. There will, therefore, be no irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, the impacts can be mitigated; however, due to the low level of impact, this will not significantly affect the assessed level of impact.	
<p>Mitigation:</p> <p>Planning:</p> <ul style="list-style-type: none"> » Plan levels to minimise earthworks to ensure that levels are not elevated; » Plan to maintain the height of structures as low as possible. » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development. <p>Operation:</p> <ul style="list-style-type: none"> » Reinststate any areas of vegetation that have been disturbed during construction. » Remove all temporary works. » Monitor rehabilitation areas post-construction and implement remedial actions. » Minimise disturbance and maintain existing vegetation as far as possible both within and surrounding the development area. <p>Decommissioning:</p> <ul style="list-style-type: none"> » Remove infrastructure not required for the post-decommissioning use of the site; and » Rehabilitate and monitor areas post-decommissioning and implement remedial actions. 		
<p>Residual Risks:</p> <p>The residual risk relates to loss of natural vegetation cover being obvious following the decommissioning of the development. Therefore, it is critical that effective rehabilitation measures are implemented during this phase.</p>		

Nature: *A change in the character of the landscape as seen from the Lutzputs Road*

The ZTV analysis indicates that McTaggart PV3 will be seen from up to approximately 8.4km of this road. At its closest, the development may be seen at a distance of approximately 100m and at its furthest, the development may be seen at a distance exceeding 6.3km.

The development will be seen in the context of the Khi Solar One CSP facility. The heliostat field, as well as the Power Tower will be visible; and the Sirius Solar PV One development, which at the time of the reporting was under construction to the south of McTaggart PV3 is also likely to be visible from this road.

	Without mitigation	With mitigation
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor to Low (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (50)	Medium (40)
Status (positive or negative)	<p>Given that the surrounding area is developing as a renewable energy development zone, it is possible that some stakeholders will see the development in a positive light.</p> <p>For those visiting the area for its natural attributes and for residents whose view is affected, the change may be seen as a Negative Impact.</p>	Neutral to negative

	However, due to distance, the fact that the road is largely used by local people and because it will be seen in the context of Khi Solar One, the change in view is likely to be seen as a neutral to negative impact.	
Reversibility	High	High
Irreplaceable loss of resources?	The components of the proposed development can be dismantled and removed at the end of the operation phase. There will, therefore, be no irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	
<p>Mitigation:</p> <p>Planning:</p> <ul style="list-style-type: none"> » Plan levels to minimise earthworks to ensure that levels are not elevated; » Plan to maintain the height of structures as low as possible. » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development. <p>Operation:</p> <ul style="list-style-type: none"> » Reinststate any areas of vegetation that have been disturbed during construction. » Remove all temporary works. » Monitor rehabilitation areas post-construction and implement remedial actions. » Minimise disturbance and maintain existing vegetation as far as possible both within and surrounding the development area. <p>Decommissioning:</p> <ul style="list-style-type: none"> » Remove infrastructure not required for the post-decommissioning use of the site; and » Rehabilitate and monitor areas post-decommissioning and implement remedial actions. 		
<p>Residual Risks:</p> <p>The residual risk relates to loss of natural vegetation cover being obvious following the decommissioning of the development. Therefore, it is critical that effective rehabilitation measures are implemented during this phase.</p>		

Nature: <u>A change in the character of the landscape as seen from local homesteads</u>		
As a result of the low carrying capacity of the landscape, there are a few agricultural homesteads in the vicinity of the proposed development. The closest homestead is located approximately 4km to the north-west of McTaggart PV3; however, the ZTV analysis indicates that the proposed development is unlikely to be visible from any of the local homesteads.		
	Without mitigation	With mitigation
Extent	Site and immediate surroundings (2)	N/A
Duration	Very short duration (1)	
Magnitude	Small (0)	
Probability	Very Improbable (1)	
Significance	Low (3)	
Status (positive or negative)	As the development is unlikely to be obvious, it is, therefore, also unlikely that it will be perceived as having a negative visual impact. The status is, therefore, neutral.	
Reversibility	High	
Irreplaceable loss of resources?	No irreplaceable loss	

Can impacts be mitigated?	No, no mitigation measures required.
Residual Risks: The residual risk relates to the infrastructure being left in place during the decommissioning phase of the project. Therefore, it is critical that effective rehabilitation measures are implemented during this phase.	

Nature: *A change in the character of the landscape as seen from local settlement areas*

All local settlements are located close to or within the Orange River Corridor. The closest settlement is in excess of 10km to the south-east of McTaggarts PV3 and the ZTV analysis indicates that the proposed development is unlikely to be visible from the settlements.

	Without mitigation	With mitigation
Extent	Site and immediate surroundings (2)	N/A
Duration	Very short duration (1)	
Magnitude	Small (0)	
Probability	Very Improbable (1)	
Significance	Low (3)	
Status (positive or negative)	As the development is unlikely to be obvious, it is, therefore, unlikely that there will be a visual impact. The status is, therefore, neutral.	
Reversibility	High	
Irreplaceable loss of resources?	No irreplaceable loss	
Can impacts be mitigated?	No, no mitigation measures required.	
Residual Risks: No residual risk.		

Nature: *Glare impacts*

There are two (2) areas where glare could be of a concern to stakeholders. These areas include:

- » Upington International Airport; and
- » The Lutzputs Road.

The visual impact assessment has shown that the impact of glare on the Upington International Airport is highly unlikely. It also indicates that glare could impact the Lutputz Road during late afternoon particularly during winter months. However due to the very limited number of vehicles on this road this impact is unlikely to have a high significance.

	Without mitigation	With mitigation
Extent	Upington International Airport Regional (3) Lutzputs Road Site and immediate surroundings (2)	Upington International Airport Regional (3) Lutzputs Road Site and immediate surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Upington International Airport Small (0) Lutzputs Road	Upington International Airport Small (0) Lutzputs Road

	Small to minor (1)	Small (0)
Probability	Upington International Airport Very improbable (1) Lutzputs Road Improbable (2)	Upington International Airport Very improbable (1) Lutzputs Road Very improbable (1)
Significance	Upington International Airport Low (7) Lutzputs Road Low (14)	Upington International Airport Low (7) Lutzputs Road Low (6)
Status (positive or negative)	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	
Mitigation: Operation: » Should glare affect motorists on the Lutzputs Road, mitigation measures could include the implementation of screen fencing or earth berms.		
Residual Risks: No residual risk.		

Nature: Potential visual impact of operational, safety and security lighting of the facility at night on observers.

McTaggart PV3 will be lit by security lights to a level sufficient to ensure that security cameras can operate at night. This is likely to result in the array being obvious at night from surrounding areas. The Khi Solar One CSP facility, located immediately to the south appears relatively dark at night.

There are obvious lights from Upington, as well as, from passing traffic and small settlements and homesteads particularly in the Orange River Valley. The area is, therefore, not completely dark during the night. There is potential for the development to add to these existing lighting levels.

	Without mitigation	With mitigation
Extent	Site and immediate surroundings (2)	Site (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Small to Minor (1)
Probability	Definite (5)	Improbable (2)
Significance	Medium (50)	Low (12)
Status (positive or negative)	The appearance of a large lit area may be accepted by most people. It is, however, likely that some people will see the expansion of lighting as a negative impact.	If the lights are generally not visible then, the occasional light is unlikely to be seen as negative. The impact is therefore neutral.
Reversibility	High	High
Irreplaceable loss of resources?	It would be possible to change and adapt the lighting / camera system so the impact cannot be seen as an irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	
Mitigation:		

Operation:

- » Use low key lighting around buildings and operational areas that are triggered only when people are present.
- » Plant to utilise infra-red security systems or motion sensor triggered security lighting.
- » Ensure that lighting is focused on the development with no light spillage outside the site.
- » Keep lighting low, no tall mast lighting should be used.

Residual Risks:

No residual risk.

8.8.4 Implications for Project Implementation

Overall, the significance of the visual impacts is expected to range from medium to low with mitigation, depending on the impact being considered, as a result of the generally undeveloped character of the landscape as well as the presence of existing similar developments that are visible in the area. The following mitigation is possible:

- » Plan the placement of the temporary laydown area and construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
- » Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.
- » Maintain the general appearance of the infrastructure.
- » Remove infrastructure not required for the post-decommissioning use.
- » Rehabilitate all affected areas.
- » Should glare affect motorists on the Lutzputs Road, mitigation measures could include the implementation of screen fencing or earth berms.
- » Use low key lighting around buildings and operational areas that are triggered only when people are present.

8.9. Assessment of Social Impacts

Impacts on the social environment are expected during both the construction and operation phases. Potential social impacts and the relative significance of the impacts associated with the development of McTaggart PV3 are summarised below (refer to **Appendix I**).

8.9.1 Results of the Social Impact Assessment

The construction phase of a PV solar development is associated with the majority of social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. A number of potential positive and negative social impacts have been identified for the development. An assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as "fatal flaws".

Based on the social impact assessment, the following general conclusions and findings can be made:

- » The potential negative social impacts associated with the construction phase are typical of construction-related projects and not just focussed on the construction of solar PV projects (these relate to an influx of non-local workforce and jobseekers, intrusion and disturbance impacts (i.e. noise and dust, possible wear and tear on roads and safety and security risks), and could be reduced with

the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.

- » The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during the operation phase.
- » The development could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and as a result of the development's location within an area which is characterised by high levels of solar irradiation and which is therefore well-suited to the development of commercial solar energy facilities.
- » The development also represents an investment in infrastructure for the generation of non-polluting, renewable energy, which, when compared to energy generated as a result of burning polluting fossil fuels, represents a positive social benefit for society as a whole.
- » It should be noted that the expected benefits associated with the project, which include the generation of electricity from renewable sources and local economic and social development, are likely to outweigh the perceived negative impacts associated with the project.

8.9.2 Description of the Social Impacts

The following positive and negative impacts have been identified and assessed for McTaggarts PV3.

Positive and negative social impacts associated with the construction phase of McTaggarts PV3:

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

Positive and negative social impacts associated with the operation phase of McTaggarts PV3:

- » Direct and indirect employment and skills development opportunities
- » Development of non-polluting renewable energy infrastructure
- » Contribution to Local Economic Development (LED) and social upliftment
- » Visual impact and sense of place impacts
- » Impacts associated with the loss of agricultural land

8.9.3 Impact tables summarising the significance of the social impacts

Construction Phase

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

It is anticipated that the construction of McTaggarts PV3 will result in the creation of approximately 300 employment opportunities at the peak of construction, comprising a mixture of skilled, semi-skilled, and low-skilled opportunities.

Employment opportunities generated as a result of the project will be temporary in nature and will last for the duration of the construction period (i.e. 12- 18 months). The majority of the general labour force will, as far as possible, be sourced from the local labour pool. Where relevant skills are unavailable from the local labour pool, these would need to be sought elsewhere. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.

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

	Without enhancement	With enhancement
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	Minor (2)	Moderate (6)
Probability	Highly probable (4)	Definite (5)
Significance	Low (28)	Medium (55)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhanced)	

Enhancement:

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

Residual impacts:

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

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

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

In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. The increase in demand for new materials and services in the

nearby area may stimulate local business and local economic development. There is likely to be a direct increase in industry and indirect increase in secondary businesses.

	Without enhancement	With enhancement
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Highly probable (4)	Definite (5)
Significance	Medium (36)	Medium (55)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhanced)	

Enhancement:

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

Residual impacts:

- » Improved local service sector, growth in local business.

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

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

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

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

Mitigation:

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

Residual impacts:

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

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

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

The labour force will not permanently reside within the area or have any reason to be on-site after hours.

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

Mitigation:

- » Working hours should be kept within daylight hours during the construction phase.
- » Employees should be easily identifiable and must adhere to the security rules of the site.
- » Provide transportation for workers (from towns such as Keimoes and Upington) to ensure workers do not need to move closer to the site.
- » The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period.

- » The appointed EPC contractor must appoint a security company and implement appropriate security procedures and measures.
- » Access in and out of the construction site should be strictly controlled by a security company appointed for the project.
- » A CLO should be appointed to implement a grievance mechanism. A communication protocol should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
- » A stakeholder management plan must be implemented by the EPC contractor to address neighbouring farmer concerns regarding safety and security.

Residual impacts:

- » None anticipated.

Nature: Temporary increase in traffic disruptions and movement patterns during the construction phase which will create impact on daily living and movement patterns

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

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

	Without mitigation	With mitigation
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Probable (2)
Significance	Medium (39)	Low (22)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

- » Working hours must preferably be restricted to daylight hours during the construction phase. Where deviation of the working hours is required it must be approved by the relevant authorities and surrounding landowners must be notified.
- » All vehicles must be road worthy and drivers must be licensed, obey traffic rules, follow speed limits and made aware of the potential road safety issues.
- » Construction vehicles should be inspected regularly by the EPC contractor to ensure their road worthiness.
- » Adequate and strategically placed traffic warning signs and control measures must be implemented along the N14, Lutzputs road and gravel farm access roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be visible at all times, and especially at night. Signage must be maintained throughout the construction phase,
- » Implement penalties for reckless driving as a way to enforce compliance to traffic rules.
- » Avoid heavy vehicle activity through residential areas during "peak" hours (when children are taken to school, people driving to work, etc.).
- » The developer and EPC contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed or damaged due to construction activities.

- » The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if damaged (i.e. wear and tear) due to construction activities.
- » A protocol for communication must be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
- » Undertaken information sessions with the surrounding communities prior to construction in order to ensure that communities are fully informed of the project to be developed in its final form. This must be undertaken through the appointment of a Community Liaison Officer (CLO).

Residual impacts:

- » None anticipated.

Nature: Nuisance impacts in terms of temporary increase in noise and dust

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

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	Medium (44)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

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

Residual impacts:

- » Residual damage from construction activities.

Nature: Intrusion impacts from construction activities will have an impact on the areas "sense of place"

Intrusion impacts such as aesthetic pollution (i.e. building materials, construction vehicles, etc.), noise and light pollution will impact the "sense of place" for the local community. Construction related activities have the potential to

negatively impact a local area's "sense of place". Such an impact is likely to be present during the construction phase. It is however expected that the project will mostly affect areas and receptors that have already been exposed to other existing energy generation infrastructure and other industrial infrastructure (i.e. for which the sense of place has already been altered).

Given the location of McTaggart PV3 on private properties, within an area characterised as having a low population density, and given the project's location within close proximity to the operational and highly visible Khi Solar One CSP Facility, as well as to the Sirius Solar PV Project One PV facility and Dyasons Klip 1 and 2 PV projects (2 x 75MW), all currently under construction, the visual impact and impact on the area's sense of place, from a social perspective, associated with the construction of the proposed project is anticipated to be of limited significance due to the development being located in a REDZ area, which is earmarked for the development of renewable energy facilities.

The assessment of the sense of place impact was undertaken through the consideration of the Visual Impact Assessment (**Appendix I**) undertaken for the project.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Small (0)
Probability	Improbable (2)	Very improbable (1)
Significance	Low (10)	Low (3)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

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

Residual impacts:

- » None anticipated.

Operation Phase

Nature: *The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy.*

During the operation phase, it is expected that up to 30 full-time employment opportunities will be available, depending on the operational requirements of the facility. These employment opportunities will include low-skilled (70%), semi-skilled (25%) and skilled (5%) opportunities. The employment opportunities generated as a result of the project will be long term and will last for the duration of operation (i.e. approximately 20 years). None of the employees appointed during the operation phase will be housed on-site. In addition to the direct employment opportunities it is anticipated that additional indirect employment opportunities will be generated during the operation of the project.

	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Small (1)	Small (1)
Probability	Highly probable (4)	Definite (5)
Significance	Low (20)	Low (25)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhance)	
Enhancement:		
<ul style="list-style-type: none"> » A local employment policy should be adopted to maximise the opportunities made available to the local community. » The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. » Vocational training programs should be established to promote the development of skills of the employees. » Proof of skills development must be provided to the upskilled individual. 		
Residual impacts:		
<ul style="list-style-type: none"> » Improved pool of skills and experience in the local area. 		

Nature: Development of non-polluting, renewable energy infrastructure.

South Africa currently relies predominantly on coal-generated electricity and as a result, the country's carbon emissions are considerably higher than those of most developing countries. The use of solar technology for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions during its operation. The generation of renewable energy (RE) utilising solar power will contribute positively to South Africa's electricity market. Given South Africa's reliance on Eskom as a power utility, the benefits associated with provision of electricity by an IPP are regarded as an important contribution, and the advancement of RE has been identified as a priority for South Africa.

Increasing the contribution of the RE sector to the local economy would contribute to the diversification of the local economy and provide greater economic stability. The growth in the RE sector as a whole could introduce new skills and development into the area. This is especially true with regards to solar power specifically considering the number of other solar power projects proposed and operational within the broader area.

The development of RE projects have the potential to contribute to the stability of the economy and could contribute to the local economy through employment generation (direct, indirect, and local service providers) and revenue generation for the LM. While the overall contribution of the project to South Africa's total energy requirements is small the facility will also contribute towards offsetting the total carbon emissions associated with energy generation in South Africa. It should however be noted that such a benefit is associated with all RE projects and not only solar power projects in particular.

	Without enhancement	With enhancement
Extent	Local- Regional- National (4)	N/A
Duration	Long term (4)	N/A
Magnitude	Low (4)	N/A
Probability	Highly probable (4)	N/A
Significance	Medium (48)	N/A
Status (positive or negative)	Positive	N/A

Reversibility	Yes
Irreplaceable loss of resources?	Yes (impact of climate change)
Can impacts be mitigated?	No
Mitigation/Enhancement: » None required.	
Residual impacts: » Reduced carbon emissions through the use of renewable energy and contribute to reducing global warming.	

Nature: *Contribution to LED and social upliftment during the operation of the project*

Projects which forms part of the DoE's REIPPP Programme are required as part of their bidding requirements to contribute towards LED and social upliftment initiatives within the area in which they are proposed. In addition, they are required to spend a percentage of their revenue on socio-economic and enterprise development, as well as allocate ownership shares to local communities that benefit previously disadvantaged communities around the project. A portion of the dividends generated by each development also need to be invested into LED projects and programmes. McTaggart PV3 therefore has the potential to contribute positively towards socio-economic development and improvements within the local area.

Socio-economic spin-offs from the project could contribute towards upliftment of the surrounding communities. An in-depth Community Needs Assessment (CNA) is required to ensure that the beneficiary community's needs are understood and sufficiently addressed by the proposed development programmes in order to contribute meaningfully towards local economic growth and development.

	Without enhancement	With enhancement
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (52)	Medium (60)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes (enhance)	

Enhancement:
 » A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful.
 » Ongoing communication and reporting is required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused.
 » The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).

Residual impacts:
 » Social upliftment of the local communities through the development and operation of the project.

Nature: *Visual impacts and sense of place impacts associated with the operation phase of McTaggart PV3*

An area's sense of place is created through the interaction of various characteristics of the environment, including atmosphere, visual resources, aesthetics, climate, lifestyle, culture, and heritage. An area's sense of place is however subjective and largely dependent on the demographics of the population residing within the area and their

perceptions regarding trade-offs. For example, while some individuals may prefer not to see any form of infrastructure development, others may be interested in large-scale infrastructure, or engineering projects, and operation of the facility, and consider the impact to be less significant. Such a scenario may especially be true given that the project comprises a renewable energy project and could therefore be seen as benefitting the local environment, when compared to non-renewable energy generation projects.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The social impacts associated with the impact on sense of place relate to the change in the landscape character and visual impact of McTaggart PV3. Given the location of McTaggart PV3 on private properties, within an area characterised as having a low population density, and given the project's location within close proximity to the operational and highly visible Khi Solar One CSP project, as well as to the Sirius Solar one PV facility (currently under construction) and Dyasons Klip 1 and 2 PV projects (2 x 75MW awarded preferred bidder), the visual impact and impact on the area's sense of place associated with the operation of McTaggart PV3 is anticipated to be of limited significance from a social perspective. The alteration of the sense of place in view of the local residents and road users will start during the construction phase and remain for the project's operational lifetime.

The identification of the significance of the impact on sense of place was undertaken through the consideration of the Visual Impact Assessment (Environmental Planning and Design, 2019) undertaken for the project. The Visual Impact Assessment identified that the impact on sense of place will be of a low significance with or without the implementation of the recommended mitigation measures.

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

Mitigation:

- » Maintain and manage the facility to be in a good and neat condition to ensure that no degradation of the area and site takes place and impacts the visual quality of the area.
- » Implement the relevant mitigation measures as recommended in the Visual Impact Assessment for the change in character and sense of place of the landscape setting.

Residual impacts:

- » The visual impact of McTaggart PV3 will remain until the infrastructure is completely decommissioned and removed. Thereafter the impact will be removed.

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

Land capability is defined as "the extent to which land can meet the needs of one or more uses under defined conditions of management". The area proposed for the development of McTaggart PV3 has a low to very-low land capability which indicates that the area is only suitable for animal grazing and no dryland crop production.

The grazing capacity of the broader study area is between 30 – 40ha per large animal unit or large stock unit; however, when converted to small stock units, the area can support between 28 – 35 head of sheep for grazing

purposes. Sheep farming is a viable long-term land use of the site, provided the current crippling drought conditions cease and the field quality is maintained by never exceeding the grazing capacity.

From an agricultural potential perspective, the area proposed for the development of the project within the development area has limited to no suitability for rainfed crop production.

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

The Soils, Land Use, Land Capability and Agricultural Potential Impact Assessment (TerraAfrica Consult, 2019) was considered for the identification of the significance relating to the impact on loss of agricultural land.

	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Small (0)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Low (15)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation:		
» Keep the project footprint as small as possible.		
» Implement mitigation measures recommended by the soils specialist.		
Residual impacts:		
» None expected to occur		

8.9.4 Implication for Project Implementation

The significance of the *positive impacts* associated with the socio-economic aspects that will be affected by McTaggart PV3 ranges from medium to high with the implementation of the enhancement measures recommended. These enhancement measures include:

- » A local employment policy should be adopted to maximise opportunities made available to the local labour force.
- » Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable, should labour be sourced from (in order of preference) the Kai !Garib Local Municipality, Dawid Kruiper Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province, South Africa, or elsewhere.
- » A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g. construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable.
- » Vocational training programmes should be established to promote the development of skills.
- » Proof of skills development must be provided to the upskilled individual.
- » A Community Needs Assessment (CNA) must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful.

The significance of the *negative impacts* associated with the social aspects that will be affected by McTaggarts PV3 ranges from low to medium with the implementation of the recommended mitigation measures. The mitigation measures include:

- » Develop and implement a local procurement policy which prioritises “locals first” to prevent the movement of people into the area in search of work.
- » Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy.
- » Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.
- » Undertaken information sessions with the surrounding communities prior to construction in order to ensure that communities are fully informed of the project to be developed in its final form. This must be undertaken through the appointment of a Community Liaison Officer (CLO).
- » Implement a method of communication whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
- » The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented.
- » All vehicles must be road worthy and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.
- » Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.

8.10. Assessment of Traffic Impacts

Traffic impacts have been identified and assessed for the development of McTaggarts PV3. The details of the impact assessment are also provided within the traffic impact assessment (refer to **Appendix K**).

8.10.1 Results of the Traffic Impact Assessment

National, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase of the solar PV facility. Some of the components (e.g. substation transformer) may be defined as abnormal loads in terms of the National Road Traffic Act (No.93 of 1996), by virtue of the dimensional limitations.

The routes leading to the development area and proposed to be used for transportation of project components, are Provincial and National Roads.

The development area is located north of the N14 national road and adjacent to the Lutzputs Road, which is a gravel road that also provides access to the existing settlement of Lutzputs. It would, therefore, need to be ensured that the road remains in good condition and will, therefore, require maintenance once the construction phase starts. A grader will be required to grade the road in order to obtain a flat even surface.

For the construction of the 75MW McTaggarts PV3 solar PV facility, the total trips can be estimated between 2 143 and 3 214 heavy vehicle trips, which will generally be made over the 12 – 18-month construction phase. In a worst-case scenario, the calculated number of trips is 13 daily trips. The impact of this on the road network would, however, be negligible as the additional peak hourly traffic would, at

most, be between 3 – 5 trips. Therefore, this impact on the existing road network in the area is deemed nominal.

The solar PV facility is expected to operate for a minimum period of 20 years and will operate 7 days a week, during daylight hours. It is assumed that once the facility is fully operational, it will require approximately 30 full time employees. It is also assumed that the workforce will be stationed on site, therefore, the vehicle trips generated will be low and will have a negligible impact on the external road network.

8.10.2 Description of the Traffic Impacts

Traffic impacts are expected during the construction and operation phases of McTaggarts PV3, as per the impact tables included in section 8.10.3 below.

Traffic impacts during the operation phase of McTaggarts PV3 will be negligible and will not have any impact on the surrounding road network. Therefore, no impact assessment table has been included below for the traffic impacts during the operation phase.

8.10.3 Impact tables summarising the significance of impacts on traffic during the construction phase (with and without mitigation)

Construction Phase Impacts

Nature: <i>Traffic congestion as a result of the transportation of components required for the development of the facility.</i>		
The transportation of equipment, material and staff to the site will lead to traffic congestion on local roads.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Very Short-term (1)	Very Short-term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (36)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Stagger infrastructure delivery to the site. » Reduce the construction phase period. » Make use of mobile batch plants and quarries in close proximity to the site. » Staff and general trips must occur outside peak traffic hours. » Regular maintenance of gravel roads by the Contractor during the construction phase and by the developer or operations manager during the operation phase. 		
Residual Impacts:		
None, traffic will return to normal levels after the construction phase is complete.		

Nature: <i>Generation of dust due to traffic.</i>		
The air quality of the area will be affected by the generation of dust through traffic		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Very Short-term (1)	Very Short-term (1)
Magnitude	Moderate (5)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (32)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Undertake dust suppression on gravel roads during construction » Undertake regular maintenance of gravel roads. 		
Residual Impacts:		
Dust pollution cannot be completely mitigated, but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction phase.		

Nature: <i>Generation of noise pollution due to increased traffic</i>		
Traffic on roads will generate noise.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Very Short-term (1)	Very Short-term (1)
Magnitude	Moderate (5)	Minor (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (32)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Stagger infrastructure delivery to the site. » Reduce the construction phase period. » Make use of mobile batch plants and quarries in close proximity to the site. » Staff and general trips must occur outside peak traffic hours. 		
Residual Impacts:		
Noise pollution cannot be completely mitigated, but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction phase.		

8.10.3 Implications for Project Implementation

The traffic impacts associated with the development of McTaggart PV3 will be low following the implementation of the mitigation measures. No impacts of high significance are expected to occur and as such the development of the solar PV facility is considered to be acceptable from a traffic perspective. The following mitigation measures have been recommended:

- » Stagger infrastructure delivery to the site.
- » Construction materials to be sourced from local suppliers as much as possible to limit the impact on the regional network.
- » Staff and general trips should occur outside of peak traffic periods.

8.11. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing McTaggart PV3. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities of a solar PV facility.

a) Land use and agriculture

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

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

Considering the state of the agricultural potential and the land capability of the broader study area and development area, the undertaking of productive agricultural activities will not be possible and will be highly restricted if attempted. The development of McTaggart PV3 provides an opportunity to undertake an efficient and productive land use activity on properties which are currently restricted in use, as described above.

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

b) Socio-economic impact

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

- » The benefits would be that there is no disruption from an influx of jobseekers into the Upington area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- » There agricultural potential of the broader study area is low, with no irrigation infrastructure present; therefore, the no-go option would be a lost opportunity for area to be used for an appropriate land use as a result of the solar resource availability over the area. Should the no-go option be considered, the low agricultural potential of the area will remain due to no irrigation infrastructure being present to

warrant for the undertaking of commercial farming practices and the area having a low land capability.

- » The main and current land use of the affected properties are the undertaking of grazing activities which is not considered to be a effective and offers limited benefit and income to the landowner, Khi CSP South Africa (Pty) Ltd, a renewable energy developer who purchased the properties for the development of renewable energy facilities. Should the no-go option be considered and implemented the landowner will lose an opportunity to develop and implement a land use that will be more suited to the land and area and beneficial to the landowner based on the grazing capacity of the properties.
- » There would be an opportunity lost in terms of job creation, skills development and associated economic business opportunities for the local economy, as well as a loss of the opportunity to generate energy from a renewable resource without creating detrimental effects on the environment. The impact is negative.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited. Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of socio-economic benefits, when considering the current socio-economic conditions of the area.

New Business: Some of the positive spin off effects that are to ensue from the project expenditure will be localised in the communities located near the site, such as the towns of Upington, Keimoes and Kakamas, as well as the smaller settlements located within the surrounding areas of the development area. The local services sector and specifically the trade, transportation, catering and accommodation, renting services, personal services and business services are expected to benefit the most from the project activities during the construction phase. New business sales that will be stimulated as a result of the establishment of the solar PV facility, albeit for a temporary period, will be lost with the implementation of the 'do nothing' alternative. Therefore, from a business perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of new business opportunities.

Employment: McTaggarts PV3 is likely to create approximately ~300 (at its peak) employment opportunities (temporary) for a period of ~12 to 18 months, depending on the final design, during the construction phase. Of this approximately 70% of the opportunities will be available to low skilled workers (construction labourers, security staff, drivers, equipment operators etc.), 25% will be available to semi-skilled personnel (electricians, site managers etc.) and 5% of employment opportunities will be for skilled individuals (engineers, project managers, site managers etc.). The development of McTaggarts PV3 within the Kai !Garib Local Municipality, and directly adjacent to the Dawid Kruiper Local Municipality, will aid in a reduction of the unemployment rate, however if the facility is not developed then the unemployment rate will not be positively influenced by the proposed development. The upliftment and socio-economic benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative. Therefore, from an employment perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of employment opportunities.

Skills development: The establishment of McTaggarts PV3 will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various PV facilities are proposed to be developed in the area, which is demarcated as a REDZ, and in the Northern Cape Province, which means that the transfer of skills from foreign experts to the local engineers and

construction workers will take place, similar to what has taken place where PV facilities have been constructed and operated within the Province and the rest of the country. The skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

Municipal goals: The implementation of McTaggart PV3 would contribute towards addressing the Local Municipality's key issue regarding high levels of poverty and unemployment, skills shortage, and inequalities, through the creation of employment opportunities, the provision of skills training opportunities, and local economic growth, including growth in personal income levels of those community members who would be employed on the project.

The no-go alternative will therefore result in the above economic benefits not being realised and a subsequent loss of income and opportunities to local people. From this perspective the no-go alternative is not preferred.

c) Regional scale impact

Should the no-go option be considered and implemented, the status quo pertaining to the requirement for additional capacity in the region will remain, as a result, the benefits associated with the introduction of renewable energy would not be realised. The Northern Cape has an ample solar resource and McTaggart PV3 is only proposed to contribute a contracted capacity of up to 75MW, which would assist in meeting the electricity demand throughout the country and would also assist in meeting the government's goal for renewable energy and the energy mix. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

- » Increased energy security;
- » Resource saving (i.e. fossil fuels and water);
- » Exploitation of South Africa's significant renewable energy resource;
- » Pollution reduction;
- » Climate friendly development;
- » Support for international agreements;
- » Employment creation;
- » Acceptability to society; and
- » Support to a new industry sector.

At present, South Africa is some way off from fully exploiting the diverse gains from renewable energy and from achieving a considerable market share in the renewable energy industry. South Africa's electricity supply remains heavily dominated by coal-based power generation, with the country's significant renewable energy potential largely untapped to date.

The Integrated Resource Plan (IRP) includes 17.8GW of renewables, 9.6GW of nuclear, 6.25GW of coal, and approximately 8.9GW of other generation sources such as hydro, and gas. Based on the updated IRP 2019,

a total of 6 422MW have been procured under the REIPP Programme and 3 876MW has been commissioned and made available to the grid. In addition, there is currently 1 474MW available from installed and operational PV facilities while an additional 5 670MW has been allocated between 2025 and

2030. This plan is yet to be finalised and promulgated. The IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies.

d) Conclusion

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government due to competition in the sector, and the number of renewable energy projects being bid to the Department of Energy. However, as the surrounding area experiences ample solar resource, not developing McTaggarts PV3 would see such an opportunity being lost. As current land use activities can continue on the broader study area once the project is operational, the loss of the land to this project during the operation phase (equivalent to 28% of the broader study area) is not considered significant. In addition, the Northern Cape Province will not benefit from additional generated power being evacuated directly into the Province's grid. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

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

- » Job creation and skills development 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 the energy generation mix in a most economic and rapid manner.
- » Provision of clean, renewable energy in an area where the energy resource 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 McTaggarts PV3.

CHAPTER 9: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 8, a solar PV facility, as the one proposed, may have effects (positive and negative) on natural resources, the social environment and on the people living in the area surrounding the project. The preceding impact assessment chapter has reported on the assessment of the impacts associated with McTaggarts PV3 largely in isolation (from other similar developments).

The McTaggarts PV3 broader study area and development area is located within a Renewable Energy Development Zone (REDZ). The specific REDZ zone within which the project is proposed is known as the Upington REDZ or REDZ 7. The REDZ areas are zones identified by the DEA⁴¹ as geographical areas of strategic importance for the development of large scale solar photovoltaic and wind energy development activities. Therefore, the REDZ areas are considered as nodes for the development of renewable energy developments where a concentration of such development has been undertaken and is expected to be further developed and grow. In close proximity to the development area and the broader study area of McTaggarts PV3 prominent renewable energy features and infrastructure has been introduced to the landscape and biophysical environment as well as the social environment present within the area. Therefore, the development of McTaggarts PV3 will not introduce renewable energy to an untouched, undeveloped landscape but rather expand such features and developments within the landscape and add to the concentration of such developments within the REDZ.

The DoE, under the REIPPP Programme, released a request for proposals (RFP) in 2011 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) since 2011, in which developers submit planned renewable energy projects for evaluation and selection. The bid selection process considers a number of qualification and evaluation criteria. The proposed tariff 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 and the promulgation of the REDZ zones, there has been a substantial increase in interest in solar PV facility developments in South Africa (largely in the Northern Cape Province), with 45 PV facilities currently operational (Energyblog, 2018⁴²). It is, therefore, important to follow a precautionary approach in accordance with NEMA to ensure that the potential for cumulative impacts⁴³ are considered and avoided where possible.

This chapter assesses the potential for the impacts associated with McTaggarts PV3 to become more significant when considered in combination with the other known or proposed solar facility projects within the area. The projects within the area under consideration in this cumulative assessment include both PV

⁴¹ Soon to be known as the Department of Environment, Forestry and Fisheries (DEFF)

⁴²<https://www.energy.org.za/data-and-tools>

⁴³ 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.

and CSP (Concentrated Solar Power) due to the existing and proposed PV and CSP facilities located in the area.

CSP makes use of a different solar power technology (which contains a different suite of infrastructure required to be constructed and operated) than PV, but is considered as part of the cumulative impact assessment as there exists an overlap between the cumulative impacts expected with the development of both PV and CSP projects in the surrounding areas of the McTaggarts PV3 broader study area.

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

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

Requirement	Relevant Section
3(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.	The cumulative impacts associated with the development of McTaggarts PV3 are included and assessed within this chapter.

9.2 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the solar PV facility and its associated infrastructure in proximity to other similar developments include impacts such as those listed below:

- » Unacceptable loss of habitat or landscape connectivity through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning;
- » Unacceptable risk to avifauna through loss of avifaunal habitats, and impacts to migration routes and nesting areas;
- » Unacceptable risk to aquatic resources through disturbance associated with construction activities and increased runoff and erosion during the operation phase;
- » Unacceptable loss of high agricultural potential areas presenting a risk to current land use activities and increased soil erosion;
- » Unacceptable loss of heritage resources (including palaeontological and archaeological resources);
- » Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion;
- » Unacceptable impact to social factors and components; and
- » Unacceptable risk and degradation due to traffic related impacts.

The role of the cumulative assessment is to determine and confirm if such impacts are relevant to McTaggarts PV3 within the broader study area being considered for the development.

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 in order to ensure that the concentration of renewable energy developments, specifically solar PV and CSP facilities do not lead to detrimental environmental impacts. 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 solar PV facility developments throughout South Africa, while the significance of the

cumulative impact on visual amenity and loss of land within a concentrated area may only be influenced by solar 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.

Figure 9.1 indicates the location of McTaggarts PV3 in relation to all other known and viable (i.e. projects with a valid Environmental Authorisation) solar PV and CSP facilities located within a radius of 30km from the development area under assessment. These projects were identified using the DEA Renewable Energy Database and current knowledge of projects being proposed in the area. In the case of McTaggarts PV3, there are several solar PV facilities located within a 30km radius of the development area (refer to **Figure 9.1** and **Table 9.1**), all at various stages of approval⁴⁴. Further to the solar PV facilities located within the area, existing and proposed CSP facilities are also located within the surrounding areas of the development area.

The potential for cumulative impacts is summarised in the sections that follow and has been considered within the specialist studies (refer to **Appendices D – K**).

Table 9.1: Solar facilities (including PV and CSP) located within the surrounding area (within a 30km radius) of the McTaggarts PV3 development area

Project Status	Project Name	DEA Reference Number(s)	Location
Operation	Khi Solar One (1 x 50MW CSP)	12/12/20/1831	Portion 03 of the Farm McTaggarts Camp No. 435 – located immediately south west of the development area.
	Upington Airport Solar PV (1 x 8.9MW PV)	12/12/20/2146	Erf 6013 Upington – located to the north-east of the development area.
Under construction – Preferred Bidder Projects	Sirius Solar PV Project One (1 x 75MW PV)	14/12/16/3/3/2/469	Remaining Extent of the Farm Tungsten Lodge No. 638 – located south east of the development area.
	Dyasons Klip 1 (1 x 75MW)	14/12/16/3/3/2/538/1	Remainder of the Farm Dyason's klip No. 454 – south-west of the development area.
	Dyasons Klip 2 (1 x 75MW)	14/12/16/3/3/2/538/2	Remainder of the Farm Dyason's klip No. 454 – south-west of the development area.
Environmental Authorisation Issued	Sirius Solar PV Project Two (1 x 75MW PV)	14/12/16/3/3/2/470	Remaining Extent of the Farm Tungsten Lodge No. 638 – located south-east of the development area.
	Kai Garib (1 x 125MW CSP)	14/12/16/3/3/2/656	Portion 03 of the Farm McTaggart's Camp No. 435 – located immediately to the south of the study area

⁴⁴ Applications for Environmental authorisation for numerous PV facilities have been undertaken within the area, however some of these applications have lapsed and are no longer considered to be valid and are therefore not considered as part of the cumulative impact assessment.

Project Status	Project Name	DEA Reference Number(s)	Location
	Bloemsmond Solar 1 (1 x 75MW PV)	14/12/16/3/3/2/815	Portions 5 and 14 of the Farm Bloemsmond No. 455 – located to the south-west of the development area.
	Bloemsmond Solar 2 (1 x 75MW PV)	14/12/16/3/3/2/816	Portions 5 and 14 of the Farm Bloemsmond No. 455 – located to the south-west of the development area.
	Rooipunt (1 x 150MW CSP)	14/12/16/3/3/1/427	Farm McTaggart Camp No. 435 – located directly to the north-west of the development area.
	Solis Power I (1 x 150MW CSP)	14/12/20/16/3/3/3/82	Portion 443 to 450 of the Farm Van Rooys Vlei – located to the north-west of the development area.
	Solis Power II (1 x 125MW CSP)	14/12/16/3/3/2/621	Portion 443 to 450 of the Farm Van Rooys Vlei – located to the north-west of the development area.
	Allepad PV1 (1 x 100MW)	14/12/16/3/3/2/1105	Erf 5315 and Erf 01 Upington - located north-east of the development area.
	Allepad PV2 (1 x 100MW)	14/12/16/3/3/2/1106	Erf 5315 and Erf 01 Upington - located north-east of the development area.
	Allepad PV3 (1 x 100MW)	14/12/16/3/3/2/1107	Erf 5315 and Erf 01 Upington - located north-east of the development area.
	Allepad PV4 (1 x 100MW)	14/12/16/3/3/2/1108	Erf 5315 and Erf 01 Upington - located north-east of the development area.
In process	Sirius Solar PV Project Three (1 x 100MW PV)	14/12/16/3/3/1/2074	Remaining Extent of the Farm Tungsten Lodge No. 638 – located south-east of the development area.
	Sirius Solar PV Project Four (1 x 100MW PV)	14/12/16/3/3/1/2075	Remaining Extent of the Farm Tungsten Lodge No. 638 – located south-east of the development area.

The McTaggart PV3 project is one of four solar PV facilities which forms part of the larger project, known as the Khunab Solar Development. The additional three projects are located directly adjacent to the McTaggart PV3 development area to the west, south and south-east. The details of the three other solar PV facilities that form part of the larger project (i.e. Khunab Solar Development) are included in **Table 9.2** below.

Table 9.2: Details of the Khunab Solar Development which comprises four solar PV facilities (including the McTaggart PV3 project under consideration)

Project Status	Project Name	DEA Reference Number(s)	Location
In process	Klip Punt PV1 (1x 75MW PV)	TBC	Portion 12 of The Farm Klip Punt 452 – located directly south-east of the development area.
	McTaggart PV1 (1x 75MW PV)	TBC	Portion 3 of the Farm McTaggart Camp No. 453 and Portion 12 of The Farm Klip Punt 452 – located directly south of the development area

	Project Name	DEA Reference Number(s)	Location
	McTaggarts PV2 (1x 75MW PV)	TBC	Portion 3 of the Farm McTaggarts Camp No. 453 – located directly west of the development area.

It should be noted that not all the solar facilities (PV and CSP) 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 (DEA, DOE, 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 solar 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 solar facilities will be implemented, this results in it being difficult to quantitatively assess the potential cumulative impacts. The cumulative impacts of other known solar facilities (PV and CSP) in the surrounding area and McTaggarts PV3 are therefore qualitatively assessed in this Chapter. The following potential impacts are considered:

- » Cumulative impacts on ecological processes (including fauna and flora)
- » Cumulative impacts on avifauna
- » Cumulative impacts on aquatic resources
- » Cumulative impacts on soil, land types and agricultural potential
- » Cumulative impacts on heritage resources (including archaeology and palaeontology)
- » Cumulative visual impacts
- » Cumulative social impacts
- » Cumulative traffic impacts

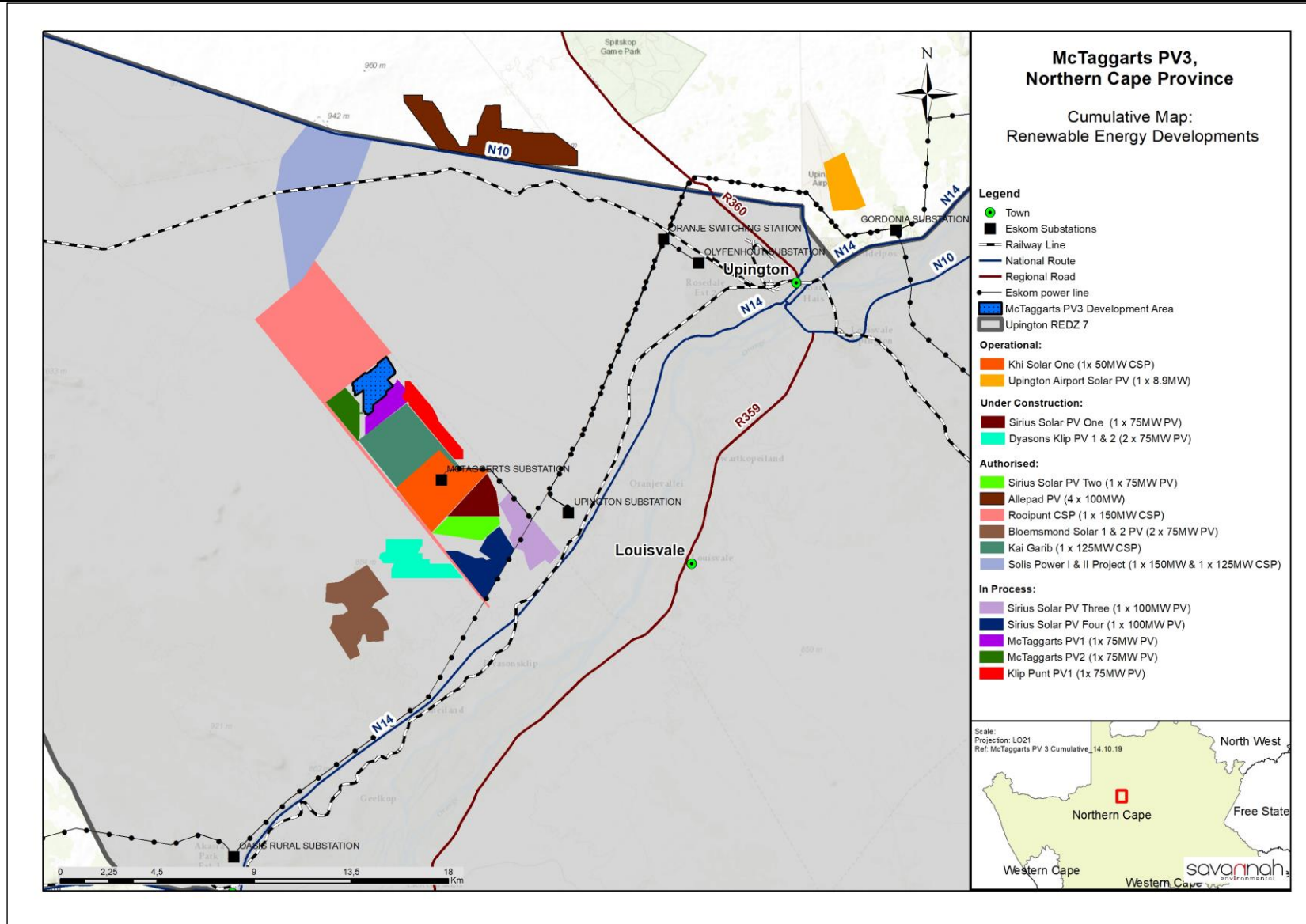


Figure 9.1: Identified solar facility projects (including PV and CSP) located within a 30km radius of the McTaggarts PV3 development area that are considered as part of the cumulative impact assessment

9.3 Cumulative Impacts on Ecological Processes

Cumulative impacts from an ecological perspective have been identified and assessed for the development of McTaggart PV3 (**Appendix D**) and are considered as a potential significant concern due to the proliferation of solar energy developments in the wider Upington area and particularly along the N14 located to the south of the proposed project.

Provided that landscape connectivity can be maintained through the implementation of adequate buffers around the major drainage lines, then the contribution of McTaggart PV3 to cumulative impacts on habitat loss and fragmentation in the area would be acceptable. In terms of habitat loss within the REDZ zone, the affected vegetation and habitat types are widespread in the area and have not experienced significant levels of transformation to date. As a result, the loss of currently intact habitat likely to result from the development is not considered highly significant. Cumulative impacts associated with the development are therefore considered acceptable.

The ecological impacts associated with McTaggart PV3 will be of a medium to low significance, depending on the cumulative impact being considered. These impacts have been assessed in the context of the extent of the proposed development, other renewable energy developments within the area and general habitat loss and transformation due to agriculture and other land use activities within the area.

Nature: <i>Reduced ability to meet conservation obligations and targets due to cumulative habitat loss</i>		
The development of McTaggart PV3 will potentially contribute to cumulative habitat loss and other cumulative impacts in the wider Upington area.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	Low (18)	Medium (30)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	To some degree, but the majority of the impact results from the presence of the facility which cannot be mitigated.	
Mitigation:		
<ul style="list-style-type: none"> » Ensure that significant sensitive habitats such as drainage features, pans and quartz patches are avoided by the development footprint. » Ensure that the fencing around each facility is fauna friendly. This includes not having any electrified strands within 30cm of the ground as well as implementing a design that prevents fauna from becoming trapped between the inner and out layer of the fence as this has been demonstrated to be a common impact associated with existing solar plants. » Ensure that an alien management plan and erosion management plan is compiled for each project are effectively implemented. 		

Nature: <i>Negative impact on broad-scale ecological processes</i>
Development of McTaggart PV3 may impact on broad-scale ecological processes such as the ability of fauna to

disperse.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (1)	Low to minor (4)
Probability	Improbable (2)	Probable (3)
Significance	Low (12)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Only partly as a significant proportion of the impact results from the presence and operation of the facility which cannot be well mitigated.	
Mitigation:		
<ul style="list-style-type: none"> » Ensure that faunal movement corridors such as drainage lines are avoided, but if these are fenced into the facility that the fence should be adequately permeable to fauna so as to reduce impacts on faunal habitat loss and movement. » Ensure that the mitigation hierarchy is applied with a particular emphasis on reducing the development footprint, rehabilitating disturbed areas and minimising degradation around the development area. » An open space management plan must be developed for the development area, which should include management of biodiversity within the affected areas, as well as that in the adjacent veld. 		

9.4 Cumulative Impacts on Avifauna

Cumulative impacts on avifauna have been identified (**Appendix E**) and include impacts to avifauna habitats, migration routes, nesting areas due to cumulative loss and fragmentation of the impacted habitats.

In terms of habitat loss, the affected Kalahari Karroid Shrubland vegetation type is still approximately 90% intact, while it has an extensive range within the bioregion. The transformation and loss of this habitat associated with McTaggart PV3 within the Upington REDZ is not considered highly significant in terms of avifaunal habitat loss. In terms of potential losses to landscape connectivity, the development area is not considered to lie within an area that is considered a likely avifaunal movement corridor or along an important ecological gradient.

The overall cumulative avifauna impact of the development is considered likely to be low. However, to maintain habitat continuity for species such as Karoo Korhaan, suitable tracks of gravel plains habitat to the east and north of the broader study area should be maintained in a natural state. The cumulative impact of the other solar facilities within the surrounding area of the development area will be of a medium significance.

Nature: *Impact on avifaunal habitats, migration routes and nesting areas due to cumulative loss and fragmentation of habitat.*

The development of McTaggart PV3 and other solar energy developments will contribute to cumulative avifauna impacts which relates to impact on habitats, migration routes and nesting areas.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (2)
Duration	Long-term (4)	Long-term (4)

Magnitude	Low (4)	Low to Moderate (5)
Probability	Improbable (2)	Probable (3)
Significance	Low (18)	Medium (33)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	To some degree, but the majority of the long-term impact results from the presence of the facility and other developments in the area, which cannot be mitigated	
Mitigation:		
<ul style="list-style-type: none"> » Minimise the development footprint as far as possible, as well as disturbance of the topsoil. A cover of indigenous grasses should be encouraged and maintained within the facility area that prevents the invasion of weeds and is the easiest to manage in the long-term. Furthermore, the developer could consider the option of allowing livestock (sheep) grazing for maintaining a low height of the grass, which is being successfully used at existing PV facilities. This will assist in maintaining natural vegetative cover which may support avifaunal population, as opposed to complete clearing of all vegetation, which is undesirable. » Ensure that suitable ecological corridors within the surrounding area are identified and maintained, whereby ecological connectivity between areas of higher conservation value are preserved. » The facility must be fenced off in a manner which allows small fauna to pass through the facility, but that does not result in terrestrial avifauna (e.g. bustards, korhaan, thick-knees, coursers) being trapped and electrocuted along the boundary fences. In practical terms, this means that the facility should be fenced-off to include only the developed areas and should include as little undeveloped ground or natural veld as possible. Single-fence designs (with the electrical fencing attached to the inside) as opposed to double-fence designs are preferred to avoid terrestrial birds becoming entrapped in the space between the two fences. » No electrified ground-strands must be present within 30cm of the ground, while the electrified strands must also be located on the inside of the fence and not the outside. Images of suitable fencing types from existing PV facilities are available on request. 		

9.5 Cumulative Impacts on Aquatic Resources

Cumulative impact on aquatic resources has been identified and assessed for the development of McTaggart PV3 (**Appendix F**). These include:

- » An increase in surface run-off velocities and the reduction in the potential for groundwater infiltration is likely to occur, considering that the development area is near the main drainage channels, however the annual rainfall figures are low.
- » Downstream alteration of hydrological regimes due to the increased run-off from the area.
- » Downstream erosion and sedimentation of the downstream systems and farming operations. During flood events, the unstable banks (eroded areas) and sediment bars (sedimentation downstream) already deposited downstream could be washed into the Gariep River, although currently there are no direct connections with the Gariep River, extreme high flows do enter the river from the development area.

The aquatic specialist has, through his involvement in water use license processes for numerous projects in the Upington area, including the Upington REDZ, developed an understanding of the mitigation implemented or proposed to be implemented by other projects within the area. Mitigation has included the selection of the best possible sites to minimise the local and regional impacts or improving the drainage or hydrological conditions within the affected aquatic systems. The improving of affected systems is viewed as a net benefit. However, the worse-case scenario has been assessed in the

cumulative impact table below, i.e. only minimum mitigation is implemented by the other projects, and that flows within these systems are sporadic.

The impacts to freshwater features associated with McTaggart PV3 will be of a low significance.

Nature: Potential cumulative impacts to the aquatic resources		
Cumulative impacts to aquatic resources that could occur with the development of McTaggart PV3 includes an increase in surface run-off velocities and the reduction in the potential for groundwater infiltration, downstream alteration of hydrological regimes and downstream erosion and sedimentation.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (1)	Low (2)
Probability	Probable (3)	Definite (5)
Significance	Low (18)	Medium (35)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
» Improve the current stormwater and energy dissipation features not currently found along the tracks and roads within the region.		
» Install properly sized culverts with erosion protection measures at the present (i.e. existing) road / track crossings.		

9.6 Cumulative Impacts Soil, Land Types and Agricultural Potential

Cumulative impacts are related to an increase in the loss of agricultural land used for livestock farming (i.e. grazing) within the Upington REDZ zone, in addition to the other areas where solar facilities have been and is proposed to be constructed. These impacts can be reduced by keeping the development footprints minimised where possible and strictly implementing soil management measures pertaining to erosion control and management and monitoring of any possible soil pollution sources such as vehicles traversing over the sites (refer to **Appendix G**).

It must however be noted that the grazing capacity of the veld in the development area is 30 to 40 hectares per large animal unit or large stock unit. When this is converted to small stock units (8 to 10 hectares per small stock unit), it indicates that the development area can support 26 to 32 head of sheep for grazing purposes. Sheep farming is a viable long-term land use of the development area permitting that the current crippling drought conditions ceases and as long as the field quality is maintained by never exceeding the grazing capacity.

The significance of the cumulative soil impacts will be medium.

Nature: Cumulative impacts in terms of loss of agricultural land		
There will be a decrease in areas available for livestock farming, which includes areas with suitable land capability for such grazing activities.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Regional (2)

Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Moderate (3)
Probability	Probable (4)	Probable (4)
Significance	Medium (32)	Medium (40)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Mitigation:		
<ul style="list-style-type: none"> » Keep the development footprints of all solar energy facilities as small as possible; and » Manage the soil quality by avoiding far-reaching soil degradation such as erosion. 		

Nature: <i>Cumulative impacts in terms of soil erosion</i>		
There will be an impact on areas susceptible to soil erosion, as well as an increase in areas susceptible to soil erosion.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Permanent (5)
Magnitude	Moderate (6)	Moderate (3)
Probability	Probable (3)	Probable (4)
Significance	Medium (30)	Medium (40)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Mitigation:		
<ul style="list-style-type: none"> » Each development must adhere to the highest standards for soil erosion prevention and management as provided for in the Soils and Agricultural Potential Impact Assessment of McTaggart PV3. 		

Nature: <i>Cumulative impacts in terms of soil pollution</i>		
There will be an increased risk of soil pollution and an increase in areas susceptible to soil pollution.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	High (3)	Regional (2)
Duration	Medium-term (3)	Permanent (5)
Magnitude	Moderate (6)	Moderate (3)
Probability	Probable (3)	Probable (4)
Significance	Medium (36)	Medium (40)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Mitigation:		
<ul style="list-style-type: none"> » Each development must adhere to the highest standards for soil pollution prevention and management as provided for in the Soils and Agricultural Potential Impact Assessment of McTaggart PV3. 		

9.7 Cumulative Impacts on Heritage (including archaeology and palaeontology)

Cumulative heritage impacts have been identified for McTaggart PV3 (refer to **Appendix H**).

Due to the location of the McTaggart PV3 development area within a REDZ, where existing and proposed solar facilities are present, the heritage cumulative impacts relate mainly to a negative impact on the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. This change in landscape character is related to an impact on the sense of place from a heritage perspective. However, due to the remoteness of the area the impact on the experience of the cultural landscape is not considered to be significant.

The cumulative heritage impacts will be low due to the remote character of the landscape within which McTaggart PV3 is proposed to be developed.

Nature: <i>Cumulative heritage impacts</i>		
The addition of multiple solar PV facilities and related infrastructure can result in widespread destruction of heritage resources and increased visual clutter in the natural and cultural landscape.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	Low (16)	Low (27)
Status (positive or negative)	Neutral	Neutral
Reversibility	High	Low
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	No, no significant impacts are anticipated, therefore no mitigation is required.	
Mitigation: N/A		

It must be noted that even if no mitigation is recommended by the specialist, the requirements of the National Heritage Resources Act (Act No. 25 of 1999) would still be relevant to each of the projects proposed to be developed within the area. Should any sites of significance be discovered to be associated with any of the proposed projects, these finds would need to be dealt with accordingly.

9.8 Cumulative Visual Impacts

Cumulative visual impacts have been identified and assessed for the development of McTaggart PV3 (refer to **Appendix I**).

In terms of general landscape change, the overall cumulative impact associated with proposed and existing solar facilities within the Uppington REDZ was assessed as having a medium significance, however, the contribution of McTaggart PV3 to this cumulative impact is assessed as low.

Cumulative visual impacts associated with proposed and existing solar facilities that are likely to affect the N14, the R359, homesteads and settlement areas are likely to have a medium significance. The contribution to these impacts associated with McTaggart PV3 is likely to be low.

Cumulative visual impacts associated with solar facilities that are likely to affect the Lutzputs Road are likely to have a medium significance. Due largely to the proximity of the PV array to the road, the contribution of McTaggart PV3 is likely to have a medium significance.

With mitigation, it is likely that the cumulative effect of glare on sensitive receivers associated with other projects and McTaggart PV3 is likely to be of a low significance. This is due to awareness of issues associated with glare, the distance of the majority of other solar facilities from sensitive receivers and the relatively simple measures that can be adopted to mitigate potential issues in this regard.

There is potential for security lighting and operational lighting associated with solar facilities to have a significant impact in a rural region where lighting levels are limited to traffic on roads passing through the area and low-level lighting associated with homesteads and small settlements. With appropriate mitigation however, general lighting levels are likely to be largely within the levels of the surrounding areas.

Cumulative visual impacts that are likely to be experienced with the development of McTaggart PV3 is assessed as having a medium to low significance, depending on the impact being considered.

Nature: Landscape Change

McTaggart PV3 will extend the general influence of development and specifically solar projects within the area. In addition, there are solar projects proposed, approved, under construction and operational on fourteen additional properties within 30km of the McTaggart PV3 development area.

McTaggart PV3 will therefore not extend the visual influence of industry, it will however intensify the influence within a relatively small area.

The combined effect of all solar projects could be significant, however because McTaggart PV3 will affect an area within which there is already significant industrial influence, it is only likely to have a relatively small contribution to landscape change.

As the impact of the proposed project on the Orange River Corridor is minimal and because it is more difficult to predict the impact of other projects on this area without undertaking a detailed analysis, only the impact of projects on the Plateau Landscape Character Area (LCA) is considered.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Site and surroundings (2)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	High (8)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Medium (45)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Unknown

Mitigation:

Planning:

- » Plan levels to minimise earthworks to ensure that levels are not elevated;
- » Plan to maintain the height of structures as low as possible;
- » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operation:

- » Reinststate any areas of vegetation that have been disturbed during construction;

- » Remove all temporary works;
 - » Monitor rehabilitated areas post-construction and implement remedial actions;
 - » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Decommissioning:
- » Remove infrastructure not required for the post-decommissioning use of the site;
 - » Rehabilitate and monitor areas post-decommissioning and implement remedial actions

Nature: Character of the landscape as seen from the N14

Views of the PV array and the on-site substation associated with McTaggarts PV3 will be limited to a short section of approximately 1km of this road at a distance of approximately 10.8km which is outside the Approximate Limit of Visibility (ALV).

If visible, the proposed project will also be viewed in the context of and adjacent to the Khi Solar One project as well as at least one other PV solar project that at the time of reporting was under construction (Sirius).

It is unlikely therefore that McTaggarts PV3 will be obvious from this road, its influence on this cumulative impact is therefore likely to be minimal.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Site and immediate surroundings (2)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Moderate to low (5)
Probability	Very improbable (1)	Probable (5)
Significance	Low (6)	Medium (60)
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Unknown

Mitigation:

Planning:

- » Plan levels to minimise earthworks to ensure that levels are not elevated;
- » Plan to maintain the height of structures as low as possible;
- » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operation:

- » Reinststate any areas of vegetation that have been disturbed during construction;
- » Remove all temporary works;
- » Monitor rehabilitated areas post-construction and implement remedial actions;
- » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

- » Remove infrastructure not required for the post-decommissioning use of the site;
- » Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Nature: Change in the character of the landscape as seen from the R359

McTaggarts PV3 could be visible intermittently to small sections of this road in the vicinity of Louisvale at a distance of approximately 13.5km. Given the distance and the extent of vegetation on the edge of the Orange River Valley, the proposed project is unlikely to be obvious from this road

McTaggart PV3 is largely screened from the road by landform and vegetation. Other solar PV projects are also likely to be largely screened from the road.

It is therefore unlikely that McTaggart PV3 will be obvious from this road, its influence on this cumulative impact is therefore likely to be minimal.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Site and immediate surroundings (2)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small (0)	Minor to Low (3)
Probability	Very Improbable (1)	Probable (3)
Significance	Low (6)	Medium (30)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No
Can impacts be mitigated?	Yes	Unknown

Mitigation:

Planning:

- » Plan levels to minimise earthworks to ensure that levels are not elevated;
- » Plan to maintain the height of structures as low as possible;
- » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operation:

- » Reinststate any areas of vegetation that have been disturbed during construction;
- » Remove all temporary works;
- » Monitor rehabilitated areas post-construction and implement remedial actions;
- » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

- » Remove infrastructure not required for the post-decommissioning use of the site;
- » Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Nature: *Change in the character of the landscape as seen from the Lutzputs Road*

McTaggart PV3 will be seen from up to approximately 5km of this road. At its closest, the development may be seen at a distance of approximately 1.2km, and at its furthest the development may be seen at a distance exceeding 5.6km.

The proposed project is therefore likely to be obvious from this road and it will add to the cumulative visual impact of renewable energy projects for travellers on this road.

Solar PV projects in close proximity to the road and the Khi Solar One CSP facility are likely to provide the major contribution to cumulative visual impacts associated with renewable energy projects in the area.

The overall cumulative impact could therefore have a medium significance. McTaggart PV3 is likely to result in a relatively low contribution to this overall impact.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Site and immediate surroundings (2)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor to low (3)	Moderate to low (5)
Probability	Definite (5)	Definite (5)

Significance	Medium (45)	Medium (60)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No
Can impacts be mitigated?	Yes	Unknown
<p>Mitigation:</p> <p>Planning:</p> <ul style="list-style-type: none"> » Plan levels to minimise earthworks to ensure that levels are not elevated; » Plan to maintain the height of structures as low as possible; » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development; <p>Operation:</p> <ul style="list-style-type: none"> » Reinststate any areas of vegetation that have been disturbed during construction; » Remove all temporary works; » Monitor rehabilitated areas post-construction and implement remedial actions; » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area. <p>Decommissioning:</p> <ul style="list-style-type: none"> » Remove infrastructure not required for the post-decommissioning use of the site; » Rehabilitate and monitor areas post-decommissioning and implement remedial actions. 		

Nature: Cumulative impact on local homesteads

Visual impacts on homesteads were assessed as being very improbable. McTaggart PV3 is therefore unlikely to contribute significantly to cumulative visual impacts on homesteads.

Because the majority of homesteads are located within the Orange River Valley and are likely to be at least partially screened from PV projects to the north by landform and vegetation their cumulative visual impact is also anticipated to be low. The Khi Solar One CSP facility is likely to be obvious.

The cumulative impact is therefore also likely to be improbable with a low significance.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Site and immediate surroundings (2)	Region (3)
Duration	Very short (1)	Long term (4)
Magnitude	Small (0)	Minor (2)
Probability	Very improbable (1)	Probable (3)
Significance	Low (3)	Low (27)
Status (positive or negative)	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Unknown
<p>Mitigation:</p> <p>Planning:</p> <ul style="list-style-type: none"> » Plan levels to minimise earthworks to ensure that levels are not elevated; » Plan to maintain the height of structures as low as possible; » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development; <p>Operation:</p> <ul style="list-style-type: none"> » Reinststate any areas of vegetation that have been disturbed during construction; » Remove all temporary works; » Monitor rehabilitated areas post-construction and implement remedial actions; » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the 		

development area.
 Decommissioning:
 » Remove infrastructure not required for the post-decommissioning use of the site;
 » Rehabilitate and monitor areas post-decommissioning and implement remedial actions

Nature: *Cumulative impact on settlements*

There are numerous small settlement areas present along the N14 and within the Orange River Valley. McTaggart PV3 is screened from these largely by landform.

McTaggart PV3 was assessed as likely to have a very improbable impact of low significance on settlements. It is therefore highly unlikely that the proposed project will have a significant contribution to cumulative impacts on settlements.

Other planned projects may impact on settlement areas. The existing Khi Solar One CSP facility, due to the height of the tower already has significant visual impact on numerous settlements in the area.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Site and immediate surroundings (2)	Regional (3)
Duration	Very short duration (1)	Long term (4)
Magnitude	Small (0)	Moderate (6)
Probability	Very improbable (1)	Probable (3)
Significance	Low (3)	Medium (39)
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	No mitigation is necessary	Unknown
Mitigation: None required		

Nature: *Cumulative impact of glare affecting local receptors*

A brief geometric review of the potential for glare to affect the Upington International Airport and the Lutzputs Road during the potentially worst time of the year (mid-winter) when the sun is furthest north and the possible angle of reflection is greatest has indicated that it is highly unlikely that glare from McTaggart PV3 will affect the Airport. It is however likely that glare from McTaggart PV3 will affect the Lutzputs Road.

Only the Lutzputs Road is considered likely to add to cumulative impacts of glare. With mitigation and because of the very low number of vehicles that use this road, the contribution to cumulative impacts is assessed as having a low significance.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Site and immediate surroundings (2)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small to minor (1)	Minor (2)
Probability	Improbable (2)	Probable (3)
Significance	Low (14)	Low (27)
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	

Mitigation:

- » Should glare prove problematic mitigation might include the provision of an opaque fence or earth bund.

Nature: *Night-time lighting impacts*

Currently lighting in the area arises from the settlement areas and homesteads within the Orange River Valley and traffic on the N14. There is also background lighting from the urban area of Upington.

There is a risk that McTaggarts PV3 will extend the influence of lighting, however with appropriate mitigation lighting levels are anticipated to be low and within the current lighting pattern.

It is likely that the development of other solar projects in the area will increase lighting levels. However, with appropriate mitigation it is anticipated that a low level of impact will occur, i.e. lighting will be within the surrounding lighting levels.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Site (1)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small to minor (1)	Small to minor (1)
Probability	Improbable (2)	Improbable (3)
Significance	Low (12)	Low (24)
Status (positive or negative)	If the lights are generally not visible, then the occasional light is unlikely to be seen as negative. The impact will be Neutral	Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	

Mitigation:

- » Use low key lighting around buildings and operational areas that is triggered only when people are present.
- » Plan to utilise infra-red security systems or motion sensor triggered security lighting;
- » Ensure that lighting is focused on the development with no light spillage outside the site; and
- » Keep lighting low, no tall mast lighting should be used.

9.9 Cumulative Social Impacts

The potential for social cumulative impacts is likely and includes both positive and negative impacts (refer to **Appendix J**). The significance of the negative impacts is low and the significance of the positive impacts is of a medium significance. This is based on the location of the McTaggarts PV3 within the Upington REDZ.

Considering the concentration of solar energy developments within the surrounding area of McTaggarts PV3, and the siting of the facility within the Upington REDZ, the potential for cumulative impacts to occur is likely. Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as an influx of jobseekers and change in the areas sense of place.

Nature: *An increase in employment opportunities, skills development and business opportunities with the establishment of more than one solar power facility.*

McTaggarts PV3 and the establishment of other solar power projects within the area has the potential to result in

significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream/spin-off business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of McTaggart PV3 alone.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local- Regional-National (4)	Local- Regional-National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Highly Probable (4)
Significance	Medium (36)	Medium (56)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impacts be mitigated?	Yes (enhanced)	

Mitigation/Enhancement:

- » The establishment of a number of solar facilities under the REIPPP Programme in the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities. The positive benefits will be enhanced if local employment policies are adopted and local services providers are utilised by the developers to maximise the project opportunities available to the local community.

Nature: *Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.*

While the development of a single solar power project may not result in a major influx of people into the area, the development of several projects at the same time may have a cumulative impact on the in-migration and movement of people. In addition, the fact that McTaggart PV3 is proposed within REDZ 7, which has specifically been earmarked for the development of large scale solar PV energy facilities, implies that the surrounding area is likely to be subject to considerable future applications and expansion of solar energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and standards of living.

It is very difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (2)	Local-Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Very Improbable (1)	Improbable (2)
Significance	Low (8)	Low (22)
Status (positive or negative)	Negative	Negative
Reversibility	Yes, reversible	Yes, reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- » Develop a recruitment policy / process (to be implemented by contractors), which will source labour locally.
- » Work together with government agencies to ensure that service provision is in line with the development needs of

the local area.

- » Form joint ventures with community organisations, through Trusts, which can provide local communities with benefits, such as employment opportunities and services.
- » Develop and implement a recruitment protocol in consultation with the municipality and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.

9.10 Cumulative Traffic Impacts

Cumulative traffic impacts have been identified for the development of McTaggarts PV3 (refer to **Appendix K**). The key traffic issues identified from a cumulative perspective and considering the location of the proposed development within the Upington REDZ, includes traffic congestion or delays on the surrounding road network and noise and dust pollution. The cumulative traffic impact assessment assumes that all proposed solar facilities would be constructed at the same time.

The construction and decommissioning phases of the solar facilities are the only phases within which significant traffic will be generated. The duration of these phases is short-term, therefore the impact of the generated traffic on the surrounding road network is temporary. During the operation phase no significant traffic impacts to the road network is expected.

Even if all solar facilities are constructed simultaneously, the road authority will consider all applications for abnormal loads and liaise and cooperate with the respective project proponents to ensure that abnormal loads on the public roads are staggered and staged to ensure that the level of impact will be acceptable.

The cumulative traffic impacts associated with McTaggarts PV3 will be of a medium significance.

Nature: *Cumulative traffic impact*

Cumulative traffic impacts are expected to occur during the construction and decommissioning of McTaggarts PV3 and other solar facilities within the surrounding area. The cumulative impacts include traffic generation and the associated noise and dust pollution.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Low (2)	Moderate (3)
Duration	Very short-term (1)	Short-Term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Definite (5)
Significance	Medium (36)	Medium (55)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Stagger component delivery to site; » Undertake dust suppression; » Reduce the construction period; » Make use of mobile batching plants and queries in close proximity to the site; » Staff and general trips must occur outside of peak traffic periods. 		

9.11 Conclusion regarding Cumulative Impacts

The assessment of the cumulative impacts was undertaken through the consideration of the McTaggart PV3 impacts in isolation and compared to the cumulative impacts of McTaggart PV3 and other solar facilities (including PV and CSP) within a 30km radius from the development area. Cumulative impacts are expected to occur with the development of McTaggart PV3 throughout all phases of the project life cycle and within all areas of study considered as part of this BA Report. The main aim for the assessment of cumulative impacts considering McTaggart PV3 is to determine whether the cumulative impact will be acceptable within the landscape proposed for the development, and whether the cumulative loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The significance of the cumulative impacts associated with the development of McTaggart PV3 are predominately low to medium, depending on the impacts being considered.

A summary of the cumulative impacts is included in **Table 9.3** below.

Table 9.3: Summary of the cumulative impact significance for McTaggart PV3 within the development area

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 or medium (depending on the impact being considered)
Avifauna	Low	Medium
Aquatic resources	Low	Medium
Soil and agricultural potential	Medium	Medium
Heritage (archaeology and palaeontology)	Low	Low
Visual	Low or medium (depending on the impact being considered)	Low or medium (depending on the impact being considered)
Social	Medium (positive impacts) Low (negative impacts)	Medium (positive impacts) Low (negative impacts)
Traffic	Medium	Medium

The following can be summarised and concluded regarding the cumulative impacts of McTaggart PV3:

- » **Ecological processes:** Provided that landscape connectivity can be maintained through the implementation of adequate buffers around the major drainage lines, then the contribution of McTaggart PV3 to cumulative impacts on habitat loss and fragmentation in the area would be acceptable. Cumulative impacts associated with the development are therefore considered acceptable.
- » **Avifauna:** The transformation and loss of this habitat associated with McTaggart PV3 is not considered highly significant in terms of avifaunal habitat loss. In terms of potential losses to landscape connectivity, the development area is not considered to lie within an area that is considered a likely avifaunal movement corridor or along an important ecological gradient. Cumulative impacts associated with the development are therefore considered acceptable.

- » **Aquatic Resources:** There will be an opportunity for project proponents within the surrounding area to improve the affected aquatic resources and the drainage or hydrological conditions. This is considered to be a net benefit. Cumulative impacts associated with the development are therefore considered acceptable.
- » **Soils, land types and Agricultural Potential:** Cumulative impacts are related to an increase in the loss of agricultural land used for livestock farming, in addition to the other areas where solar facilities have been and is proposed to be constructed. The significance of the impacts are medium which is considered to be acceptable from a cumulative perspective.
- » **Heritage (including archaeology and palaeontology):** The heritage cumulative impacts relate mainly to a negative impact on the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. However, due to the remoteness of the area the impact on the experience of the cultural landscape is not considered to be significant. Cumulative impacts associated with the development are therefore considered acceptable.
- » **Visual:** There will be no unacceptable impact on the visual quality of the landscape associated with the development of McTaggarts PV3 and other solar facilities within the surrounding area. Cumulative visual impacts relate to change in the character of the landscape as seen from the N14, the R359 and the Lutzputs Road (gravel in nature), cumulative impact on local homesteads, settlements, glare and lighting of the facilities. The significance of the visual cumulative impacts will be medium to low, depending on the impact being considered. No impacts of a high significance have been identified. Cumulative impacts associated with the development are therefore considered acceptable.
- » **Social:** Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as an influx of jobseekers and change in the areas sense of place. The significance of the impacts will be medium for positive impacts and low for negative impacts. Cumulative impacts associated with the development are therefore considered acceptable.
- » **Traffic:** There will be no unacceptable impact on traffic associated with the development of McTaggarts PV3 and other solar facilities within the surrounding area. Cumulative traffic impacts relate mainly to the generation of traffic congestion and delays and the associated noise and dust. The significance of the impacts will be medium.

Based on the specialist cumulative assessment and findings, the development of McTaggarts PV3 and its contribution to the overall impact of all solar facilities (including both PV and CSP) to be developed within a 30km radius, it can be concluded that the McTaggarts PV3 cumulative impacts will be of a low to medium significance. There are, however, no impacts or risks identified to be considered as unacceptable with the development of McTaggarts PV3 and other solar facilities within the surrounding area. In addition, no impacts which will result in whole-scale change are expected with the proposed development.

CHAPTER 10: CONCLUSIONS AND RECOMMENDATIONS

McTaggarts PV3 (Pty) Ltd, a Special Purpose Vehicle (SPV) proposes the development of McTaggarts PV3, a photovoltaic (PV) solar energy facility, as well as, associated infrastructure on a site located 24km south-west of the town of Upington in the Northern Cape Province. A broader study area has been identified for the development of McTaggarts PV3 which consists of two affected properties including Portion 3 of the Farm McTaggarts Camp 453 and Portion 12 of the Farm Klip Punt 452. The broader study area falls within the Kai !Garib Local Municipality and the greater ZF Mgcawu District Municipality. The broader study area also borders the Dawid Kruiper Local Municipality to the east.

A development area of 260ha has been identified within the broader study area by the proponent for the development of McTaggarts PV3 and associated infrastructure, which has been fully considered within this BA process and assessed in terms of its suitability from an environmental and social perspective within this BA Report.

The development area is regarded as being of a sufficient extent to provide opportunity for the avoidance of major environmental sensitivities. McTaggarts PV3 will have a contracted capacity of up to 75MW and will include specific infrastructure, namely:

- » Fixed-tilt or tracking solar PV panels with a maximum height of 3.5m;
- » Centralised inverter stations or string inverters;
- » A temporary laydown area;
- » Cabling between the panels, to be laid underground where practical;
- » A 22kV or 33kV/132kV on-site substation of up to 1ha in extent to facilitate the connection between the solar PV facility and the electricity grid;
- » An access road to the development area with a maximum width of 6m;
- » Internal access roads within the PV panel array area with a maximum width of 5m; and
- » Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses, a workshop and visitors centre.

McTaggarts PV3 (Pty) Ltd has confirmed that the development area is suitable for the development of a solar energy facility from a technical perspective due to the available solar resource, access to the electricity grid, current land use, land availability, site-specific characteristics such as topography and accessibility, the location within the Upington REDZ, as well as the proximity of the area to authorised and constructed solar energy facilities, i.e. the operational Khi Solar One CSP facility; and the Sirius Solar PV One project and the Dyasons Klip 1 and Dyasons Klip 2 PV projects, which are currently under construction.

A summary of the recommendations and conclusions for the proposed development as determined through the BA process is provided in this Chapter.

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

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of the BA 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 McTaggart PV3 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 McTaggart PV3 has been included as section 10.6. Sensitive environmental features located within the McTaggart PV3 development area, overlain with the proposed development footprint has been identified and are shown in Figure 10.1 . An Environmental Sensitivity and Layout Map of McTaggart PV3 has been included as Figure 10.2 which overlays the development footprint of the solar PV facility with the environmental sensitive features located within the development area. A summary of the positive and negative impacts associated with McTaggart PV3 has been included in section 10.2.
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation of McTaggart PV3 have been included in section 10.7.
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 McTaggart PV3 should be authorised has been included in section 10.7.

10.2. Evaluation of McTaggart PV3

The preceding chapters of this BA Report together with the specialist studies contained within **Appendices D-K** provide a detailed assessment of the potential impacts that may result from the development of McTaggart PV3. This chapter concludes the environmental assessment of the solar PV facility by providing a summary of the results and conclusions of the assessment of the development footprint proposed for McTaggart PV3. In doing so, it draws on the information gathered as part of the BA process, the knowledge gained by the environmental specialists and the Environmental Assessment Practitioner (EAP) and presents a combined and informed opinion of the environmental impacts associated with the development.

No environmental fatal flaws were identified in the detailed specialist studies conducted, and no impacts of unacceptable significance are expected to occur with the implementation of the recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features and the undertaking of monitoring, as specified by the specialists. Some mitigation measures have already been considered and implemented through the micro-siting of the solar PV facility development footprint, such as the avoidance of the drainage line and poorly developed drainage lines located within the

development area of McTaggarts PV3, as well as the placement of the development area outside and to the east of the drainage line which bisects Portion 3 of the Farm McTaggarts Camp 453.

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

- » Impacts on ecology, flora and fauna.
- » Impacts on avifauna.
- » Impacts on aquatic resources.
- » Impacts to soils, land types and agricultural potential.
- » Impacts on heritage resources, including archaeology and palaeontology.
- » Visual impacts on the landscape as a result of the facility.
- » Positive and negative social impacts.
- » Traffic impacts.

10.2.1 Impacts on Ecology

The Ecological Impact Assessment (**Appendix D**) assessed the impact of McTaggarts PV3 on the sensitive ecological features present within the development area for the life-cycle of the development. The assessment identified impacts within the construction, operation and decommissioning phases of the project.

During the construction phase (and the decommissioning phase), the impacts include impacts on vegetation and listed or protected plant species and direct faunal impacts. The duration of the impacts range from long-term to short-term, with the magnitude of the impacts ranging from medium to low. The significance of the construction phase impacts is medium or low (depending on the impact being considered) and with the implementation of the mitigation measures recommended by the specialist. No impacts of high significance were identified from an ecological perspective.

During the operation phase, the anticipated impacts include habitat degradation due to erosion and alien plant invasion and faunal impacts due to the operation of the facility. The duration of the impacts will be long-term, with the magnitude of the impacts ranging from medium to minor. The significance of these impacts for the operation phase will be low, with the implementation of the recommended mitigation measures. No impacts of a high significance were identified.

From the findings of the Ecological Impact Assessment it can be concluded that no impacts of high ecological significance or fatal flaws were identified which would hinder the development of McTaggarts PV3. The development area is considered suitable for the establishment of McTaggarts PV3 and all impacts associated with the development can be mitigated to an acceptable level of either low or medium significance (depending on the impact under consideration). Therefore, the proposed development and the predicted ecological impact is considered to be appropriate and acceptable from an ecological perspective and will not result in detrimental impacts to ecosystems and habitat features within the development area and within the adjacent properties. As a result, the specialist has indicated that the development may be authorised, constructed and operated subject to the implementation of the recommended mitigation measures.

Considering the development footprint assessed for McTaggarts PV3, the specialist has indicated that the project can be supported from a terrestrial ecology point of view.

10.2.2 *Impacts on Avifauna*

The Avifauna Impact Assessment (**Appendix E**) is based on the findings of two field surveys undertaken in spring (4 – 8 October 2018) and again in late summer (9 -12 April 2019). The avifauna impact identified to be associated with the construction phase (including decommissioning) will be negative with a short-term duration and will have a magnitude ranging from moderate to low. For the operation phase, the impact will also be negative, with a long-term duration for the life of the facility and a magnitude of moderate to low.

During the construction phase (and decommissioning phase) of McTaggarts PV3, direct avifauna impacts include habitat loss and disturbance related to vegetation clearance and the displacement of shy avifauna species as a result of noise and an increased human presence associated with construction-related activities. The significance of the construction phase impact will be medium, with the implementation of mitigation measures. No impacts of a high significance from the construction phase are expected to occur.

It must be noted that the northern section of the development area overlaps with gravel plains located which has been noted to be used by red-listed avifaunal species, including the Karoo Korhaan and Kori Bustard. This habitat will be lost where panels as part of McTaggarts PV3 are installed, however the loss of habitat will be less than 1% of just this habitat tract and is therefore considered of low significance.

Impacts on avifauna during the operation phase of McTaggarts PV3 include collisions with PV panels, entrapment along perimeter fencing, disturbance and night lighting. The significance of the impacts will be low, with the implementation of mitigation measures. No impacts of a high significance are expected to occur during the operation phase.

From the results of the Avifauna Impact Assessment, it can be concluded that the development area for McTaggarts PV3 is considered to represent a broadly suitable environment for the location of a solar PV facility. Taking into consideration that the development area supports a typical bioregional avifaunal assemblage, and that there are no known communal breeding or roosting sites of red-listed species, there are no impacts associated with the development that are regarded to be of a high residual significance and which cannot be mitigated to a low significance. Therefore, the development of McTaggarts PV3 is considered to be acceptable and supported from an avifaunal perspective.

From the results of the Avifauna Impact Assessment, it is concluded that no fatal flaws will be associated with the development of McTaggarts PV3. The specialist has indicated that the project can be authorised subject to the implementation of the recommended mitigation measures.

10.2.3 *Impacts on Aquatic Resources*

The Aquatic Resources Impact Assessment (**Appendix F**) assessed the impact of McTaggarts PV3 on aquatic resources and/or features present within the broader study area and development area for the life-cycle of the project.

During the construction and operation phase, impacts expected with the development of McTaggarts PV3 include a loss of riparian systems associated with the mainstem rivers Helbrandleegte and Helbrandkloofspruit where these systems are directly infringed on; loss of wetlands; impact on poorly

developed drainage lines; impact on riparian and wetland systems through increase in surface water runoff; increase in sedimentation and erosion and water quality impacts. The impacts will be negative with mainly a long-term duration and high to low magnitude (depending on the impact being considered). From the findings of the Aquatic Resources Impact Assessment, it is concluded that the proposed layout for McTaggarts PV3 would have no direct impact on the mainstem rivers (well-developed drainage lines including Helbrandleegte and Helbrandkloofspruit) and the aquatic environment for the most part, as the layout avoids the significant high sensitivity watercourses. The only exception are poorly developed drainage lines of a high sensitivity are present within the central southern and north eastern corner of the development area and development footprint where PV panels will span these features.

The proposed position of the on-site facility substation within the development area is within the buffer area of a poorly developed drainage (not the feature itself) line considered to be of a high sensitivity. It is recommended by the specialist that the on-site facility substation be located outside of the drainage feature to reduce the risk of habitat loss and water quality related issues should any water flow occur during the life of the facility (i.e. as a substation unit stores oils which could directly impact the aquatic feature).

A small pan identified as being of a high sensitivity is located in the western portion of the development footprint, however due to the size and the functionality of the pan, the pan is not considered to be significant. The loss of this aquatic feature to the development of McTaggarts PV3 is therefore considered to be acceptable.

Road crossings, associated with the assessed development area and development footprint, are located in the smaller drainage areas, however with suitable mitigation (proper stormwater management and post construction rehabilitation) the impact would be of a low significance. This rating of low significance is also based on the consideration that the PV panels will span these features where feasible and that the mounting structure will be located outside of the delineated systems/features.

Based on the findings of the Aquatic Resources Impact Assessment there is no objection to the authorisation of the proposed activities, subject to the implementation of the specialist recommendations and mitigation measures. It is recommended by the specialist that a detailed walkdown is conducted by an aquatic specialist of the final development footprint prior to the commencement of the construction phase to ensure that the PV panel mounting structures are located in areas of suitable sensitivity from an aquatic perspective in order to minimise damage of vegetation (and to focus disturbance in areas already transformed and disturbed); and to confirm the position of the on-site substation located within an area considered to be acceptable from an aquatic perspective (i.e. avoidance of the buffer area associated with the aquatic resource).

Therefore, significance of the remaining impacts assessed for the aquatic systems after mitigation would be low. This includes the internal roads proposed that would need to cross some of these aquatic systems. This is also based on the consideration that in some areas, the PV panels will span these aquatic resources (i.e. features) however the footings/mounting structures will be located outside of the identified features.

The construction and operation of McTaggarts PV3 and the associated infrastructure is supported from an aquatic resources perspective and is considered acceptable subject to the proponent obtaining the necessary water use authorisation from the Department of Water and Sanitation and the implementation of the recommended mitigation measures from the specialist.

10.2.4 Impacts on Soil and Agricultural Potential

The Soils, Land Use and Agricultural Impact Assessment (**Appendix G**) has identified and assessed impacts associated with the development of McTaggarts PV3. These impacts are expected during the construction and operation phases and include, soil erosion, chemical pollution and an impact on the current land capability of the development area. These impacts will be negative with a permanent to short-term duration (depending on the impact being considered) and will have a magnitude of moderate to low. The significance of the impacts is medium or low (depending on the impact being considered) and following the implementation of the recommended mitigation measures.

No fatal flaws have been identified from a soils and agricultural perspective; therefore, all impacts can be mitigated to be within an acceptable level of impact during life cycle of the project. Therefore, the development of McTaggarts PV3 is considered to be acceptable from a soils and agricultural perspective.

The specialist has indicated that the development of McTaggarts PV3 can be authorised and that the development footprint proposed and assessed as part of this BA Report is acceptable from a soils and agricultural potential perspective. This is subject to the implementation of the recommended mitigation measures as provided by the specialist.

10.2.5 Impacts on Heritage (including archaeology and palaeontology)

The Heritage Impact Assessment (**Appendix H**) assessed the impact of McTaggarts PV3 on archaeological and palaeontological resources within the broader study area and the development area. It is expected that impacts to heritage will occur during the construction phase due to the on-ground disturbance required by the construction activities.

No significant archaeological resources were identified within the footprint of McTaggarts PV3. The Stone Age occurrences identified consist of isolated find and low-density ex-situ surface scatters containing Middle Stone Age Material with a few incidences of Early and Later Stone Age lithics. The identified archaeological material is of a low significance due to, archaeological samples of a small size and void of context offering little scientific value. Therefore, these Stone Age finds are regarded as not being worthy of any conservation; therefore, these sites have been sufficiently recorded and no further action will be required. The significance of the impact on archaeological resources is therefore low. The duration of the impact will be permanent should the impact occur and will have a low magnitude.

Construction-related activities are unlikely to have an impact on the fossil heritage if preserved within the development area, however, for McTaggarts PV3, the geological structures of the area suggest the rocks are either of an igneous origin and too old to contain any fossil heritage. Therefore, based on the experience of the specialist and the lack of any previously recorded fossils from the broader study area, it is unlikely that any fossil heritage will be preserved and therefore the impact is considered to be of a low significance. The duration of the impact will be permanent should the impact occur and will have a low magnitude.

Based on the nature of the archaeological resources identified and the lack of any fossils recorded or expected in the area, the significance of the heritage impacts will be low. Therefore, the proposed development and the impact to heritage resources is considered to be appropriate and acceptable from a heritage perspective and will not result in detrimental impacts.

10.2.6 Visual Impacts

The Visual Impact Assessment (**Appendix I**) identified negative and neutral impacts on visual receptors during the construction and the operation phases of McTaggart PV3. The impacts includes a change in the character and sense of place of the landscape setting, a change in the character of the landscape as seen from the N14 national road, the R359 and the Lutzputs Road, a change in the landscape as seen from local homesteads and settlement areas, glare impacts which could affect travellers on the Lutzputs Road and the flight path of the Upington International Airport, and visual impacts related to the operational, safety and security lighting of the solar PV facility on observers.

The duration of the impacts is expected to be long-term for majority of the visual impacts and with a magnitude ranging from low to small. The significance of the impacts will be low or medium (depending on the impact being considered) with the implementation of mitigation. No impacts of a high significance are expected to occur and it can be concluded that the development of McTaggart PV3 will be viewed in the context of the Khi Solar One CSP facility and the Sirius Solar PV One project which is currently under construction. The development of McTaggart PV3 is therefore considered to be acceptable from a visual perspective.

10.2.7 Social Impacts

The Social Impact Assessment (**Appendix J**) identified that most social impacts associated with the development of McTaggart PV3 will have a short-term duration associated with the construction phase and long-term duration during the operation phase of the project. The magnitude of the impacts ranges from high to small (depending on the impact being considered) and the status thereof. Both positive and negative impacts have been identified for both the construction and operation phases of the development.

During the construction phase, negative impacts include, nuisance impacts (including noise and dust), an influx of construction workers and job seekers to the area and a change in population, safety and security impacts, impacts on daily living and movement patterns, visual and a sense of place impacts. The significance of the negative construction phase impacts will be low with the implementation of the recommended mitigation measures. The positive social impacts associated with the construction phase of McTaggart PV3 include, an economic multiplier effect; and direct and indirect employment and skills development opportunities. The significance of the positive impacts will be medium with the implementation of the recommended enhancement measures by the specialist.

Impacts associated with the operation of McTaggart PV3 will be both positive and negative. The negative impacts are related to the change in the sense of place associated with the operation of the solar PV facility. The significance of the negative impacts will be low with the implementation of the recommended mitigation measures. The positive impacts associated with the operation of the facility relate to the development of non-polluting renewable energy infrastructure, a contribution to Local Economic Development (LED) and social upliftment, and the creation of employment and skill development opportunities for the local economy and the country. The significance of the positive impacts will be low and medium with the implementation of the recommended enhancement measures.

McTaggart PV3 is unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. Considering the findings

of the report and potential for mitigation it is the reasoned opinion of the specialist that McTaggarts PV3 can be authorised from a social perspective.

10.2.8 Impacts on Traffic

Traffic impacts are expected with the development of McTaggarts PV3 which were identified and assessed as part of a Traffic Impact Assessment (**Appendix K**).

During the construction phase, traffic, noise and dust will be generated through the transportation of project components and employees to the development area. The duration of the impacts will be of a very short-term and will have a low to minor magnitude. The significance of the construction phase impacts on traffic will be low, with the implementation of the mitigation measures recommended by the specialist.

The traffic generated during the operation phase of McTaggarts PV3 will be minimal and of no significance to the existing road network. Therefore, the impacts of traffic for this phase are not considered further.

Furthermore, no fatal flaws and impacts of a high significance are expected and therefore the development of McTaggarts PV3 is considered to be acceptable from a traffic perspective.

10.2.9 Assessment of Cumulative Impacts

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

The McTaggarts PV3 facility is located within the Upington Renewable Energy Development Zone (REDZ), or REDZ 7. The REDZ areas are zones identified by the DEA as a geographical area of strategic importance for the development of large-scale solar photovoltaic and wind energy development activities. Therefore, the REDZ areas are considered as nodes for the development of renewable energy developments. At present one operational CSP facility and three (3) PV solar energy facilities under construction are located⁴⁵ within the vicinity of the development area for McTaggarts PV3. These include the operational Khi Solar One CSP facility, and the Dyasons Klip 1 PV Project, Dyasons Klip 2 PV project, and the Sirius Solar PV One project which are currently under construction.

⁴⁵ <http://www.energy.org.za/map-south-african-generation-projects>

Considering all aspects, cumulative impacts associated with McTaggart PV3 have been assessed to be acceptable, with no unacceptable loss or risk expected (refer to **Table 10.1** and Chapter 9).

Table 10.1: Summary of the cumulative impact significance for McTaggart PV3

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 or medium (depending on the impact being considered)
Avifauna	Low	Medium
Aquatic resources	Low (with the implementation of the specialist recommendations)	Medium
Soil and agricultural potential	Medium	Medium
Heritage (archaeology and palaeontology)	Low	Low
Visual	Low or medium (depending on the impact being considered)	Low or medium (depending on the impact being considered)
Social	Medium (positive impacts) Low (negative impacts)	Medium (positive impacts) Low (negative impacts)
Traffic	Medium	Medium

Based on the specialist cumulative assessment and findings, the development of McTaggart PV3 and its contribution to the overall impact of all solar facilities (including both PV and CSP) to be developed within a 30km radius, it can be concluded that the McTaggart PV3 cumulative impacts will be of a low to medium significance. There are, however, no impacts or risks identified to be considered as unacceptable with the development of McTaggart PV3 and other solar facilities within the surrounding area. In addition, no impacts which will result in whole-scale change are expected with the proposed development.

10.3. Environmental Sensitivity Mapping

As part of the specialist investigations undertaken within the development area of McTaggart PV3 specific environmental features were identified which will be impacted by the placement of the development footprint (i.e. infrastructure) associated with the facility. The current condition of the features identified (i.e. intact or disturbed) will inform the sensitivity of the environmental features and its capacity for disturbance and change associated with the proposed development.

The environmental features identified within and directly adjacent to the development area and development footprint are illustrated in **Figure 10.1**. The features identified specifically relate to ecological and avifauna habitats, aquatic resources and heritage resources. The following points provide a description of the features present within the development area:

- » Heritage resources are located within the northern section of the development area. These resources include Stone Age occurrences consisting of isolated finds, and low-density ex-situ surface scatters containing predominantly Middle Stone Age (MSA) material, with a few incidences of Early and Later Stone Age lithics. These resources are also scattered within the development footprint of McTaggart PV3.
- » The northern section of the development area overlaps with gravel plains located within this area. This habitat has been at times noted to be used by red-listed avifaunal species, including the Karoo

Korhaan and Kori Bustard. This habitat is also located within the development footprint of McTaggarts PV3.

- » A drainage line is located within the northern section of the development area and comprises a significant woody component. Linear infrastructure of the development footprint for McTaggarts PV3 infringes on this feature.
- » Poorly developed drainage lines are located within the southern and northern sections of the development area. These features are mostly avoided by the development footprint, with some infringement occurring in the southern section of the development footprint by PV panels and internal access roads.
- » One small pan is located within the southern section of the development area and development footprint. The development footprint of McTaggarts PV3 infringes on this feature.
- » The majority of the development area and development footprint contains a plains habitat which is located throughout the entire extent of the development area.

In the areas surrounding the development area, the following environmental feature, other than those discussed above are present and mapped (**Figure 10.1**) is summarised below. Due to the location of the feature outside of the development area boundary, no infringement by the McTaggarts PV3 development footprint is expected.

- » Major drainage line located along the south-western boundary of the development area.

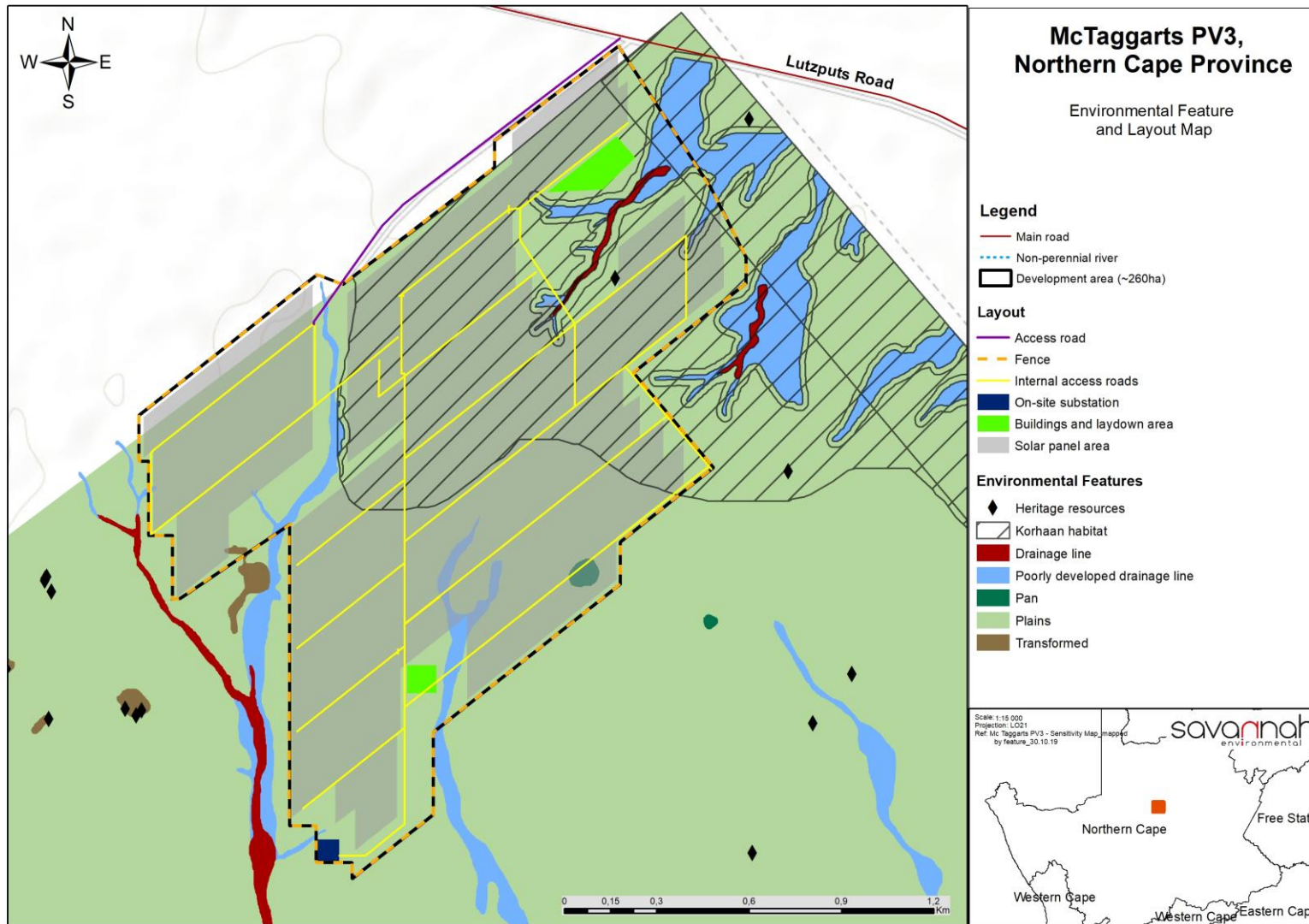


Figure 10.1: Environmental features identified within the development area and development footprint of McTaggarts PV3 (A3 map is included in Appendix O)

Considering the environmental features identified within the development area, the specialists have provided an indication of the sensitivity of these features for the development of McTaggarts PV3 within the assessed development area. The features and the sensitivities thereof have been considered by the proponent for the placement of the development footprint within the development area of McTaggarts PV3. The points below describe the sensitivity of the features as identified and mapped in **Figure 10.1**. **Figure 10.2** provides a sensitivity map of the development area overlain with the development footprint.

- » A low sensitivity rating has been applied to the heritage resources located in the northern section of the development footprint. The low sensitivity rating is based on the small sample sizes and lack of archaeological context which offers little scientific value. These resources are not considered to be conservation-worthy.
- » An internal access road crosses a drainage line within the northern section of the development area and development footprint. This feature is considered to be of a very high sensitivity from an ecological, avifauna and aquatic perspective. The infringement of the feature by linear infrastructure is considered to be acceptable. Major development, such as the placement of PV Panels in this very high sensitivity area would not be considered as acceptable.
- » Poorly developed drainage lines are of a high sensitivity and is relevant to ecology, avifauna and aquatic. From an ecological and avifaunal perspective, development within the high sensitivity areas should be constrained as far as possible. Although limited development in the high sensitivity areas is acceptable, these areas are vulnerable to cumulative impact and so this should be restricted as much as possible to limit impacts to an acceptable level. The development footprint in the high sensitivity areas has been significantly reduced through careful placement of the infrastructure, and as a result, the assessed footprint and associated impact in the high sensitivity areas is considered acceptable. From an avifauna perspective, development of McTaggarts PV3 would potentially result in much of these habitats and their functioning being lost, and therefore, where possible, buffer zones (50m to 100m width) must be implemented around the largest and most significant of these habitats (the development footprint assessed already considers and accommodates these features as per the recommendations of the specialist). From an aquatic perspective, proposed position of the on-site facility substation within the development area is within a buffer area of a poorly developed drainage line, which is of a high aquatic sensitivity. It is recommended by the specialist that the on-site facility substation be located outside of the buffer area to reduce the risk of habitat loss and water quality related issues should any water flow occur during the life of the facility (i.e. as a substation stores oils, which could directly impact the aquatic feature). This will be undertaken during the micro-siting of the project and suitable placement of the on-site substation will be confirmed by an aquatic specialist during the required walkdown survey.
- » The small pan located within the northern section of the development footprint is considered to be of a high sensitivity from an ecological, avifauna and aquatic perspective. From an ecological and avifaunal perspective, development within the high sensitivity areas should be constrained as far as possible. Although limited development in the high sensitivity areas is acceptable. The development footprint in the overall high sensitivity areas has been significantly reduced through careful placement of the infrastructure and the assessed footprint and associated impact in the high sensitivity areas is

considered acceptable. From an avifauna perspective, the small pan presents a restricted habitat due to the denser vegetation and development of the solar energy facility would potentially result in much of the habitat and the ecological functioning being lost. From an aquatic perspective, it is considered that the small pan will be lost, however due to the size and the functionality of the pan, the pan is not considered to be significant. The loss of this aquatic feature to the development of McTaggart PV3 is therefore considered to be acceptable.

- » The gravel plains associated with Korhaan habitat is of a medium high avifauna sensitivity. This habitat will be lost where panels as part of McTaggart PV3 are installed, however the loss of habitat will be less than 1% of just this habitat tract and is therefore considered of low significance.
- » Areas of medium sensitivity from an avifauna perspective relate to the typical sandy plains which is located within the majority of the McTaggart PV3 development area and development footprint. Considering the extent of the habitat available within the area, the infringement on the sandy plains is considered to be acceptable.

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 BA Report and the EMP 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 solar PV facility* - The cost of loss of biodiversity is considered to be limited due to the placement of infrastructure mainly within vegetation and features considered to be of a low and medium sensitivity, with limited loss within areas of a medium high sensitivity. Loss of limited high sensitivity areas are expected with the development footprint assessed within this BA Report; however the limited loss is considered as acceptable based on the avoidance of the larger and more prominent drainage systems by the project.
- » *Loss of avifauna habitat* – The cost of the loss of habitat is not considered to be significant as the majority of the avifauna of the surrounding environment appears fairly similar to that found across the Kalahari and the Nama-Karoo bioregions in the Northern Cape Province. There is an absence of communal or solitary roosting and nesting sites for red-listed species within the broader study area. A number of species do occur in the area primarily for foraging and large tracts of suitable habitat remain within the surrounding environment. Only a limited acceptable extent of the Korhaan habitat will be impacted due to the development of McTaggart PV3.

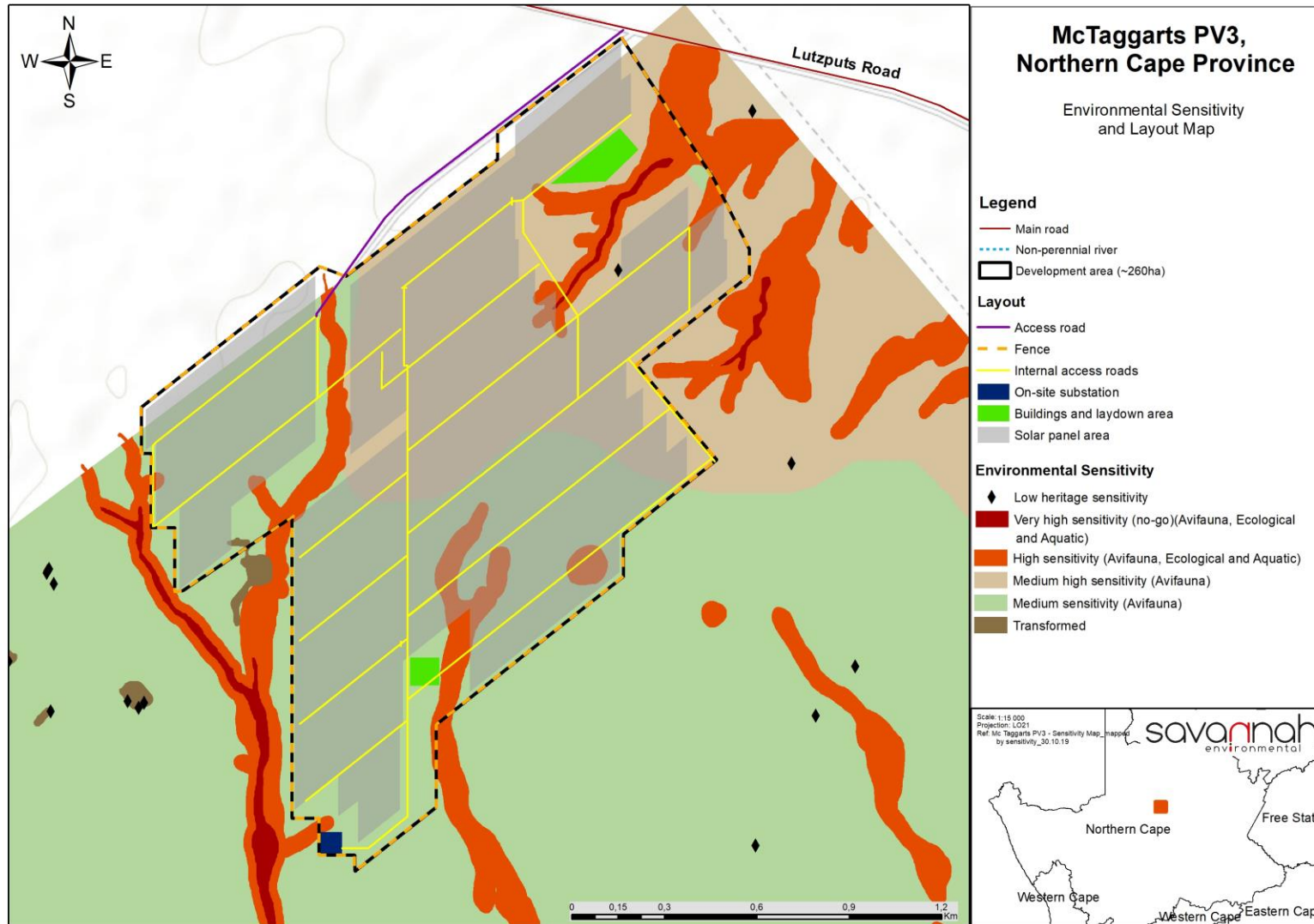


Figure 10.2: Environmental sensitivity map overlain with the development area and development footprint of McTaggarts PV3 (**A3 map is included in Appendix O**)

- » *Visual impacts associated with the solar PV Facility* - The development of McTaggarts PV3 may have a visual impact within an 11.3km radius of the solar PV facility, which will be of a low significance with the implementation of the recommended mitigation measures. The McTaggarts PV3 development will be viewed against existing renewable energy facilities, including the Khi Solar One CSP facility and the Dyasons Klip 1 PV Project, Dyasons Klip 2 PV project, and the Sirius Solar PV One project which are currently under construction, and therefore limited cost from a visual perspective is expected to occur.
- » *Change in land-use and loss of land available for agricultural activities within the development footprint* - The environmental cost is anticipated to be very limited due the fact that the development footprint does not impact on any areas of high agricultural potential.
- » *An increase in traffic* - The construction, operation and decommissioning of McTaggarts PV3 will increase traffic, however this increase will be minimal and of a low significance.

Benefits of McTaggarts PV3 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 pre-construction, construction, operation and decommissioning phases of the project.
- » The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- » The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy development.
- » Contribution to the development and growth of the Upington REDZ and the associated benefits in terms of the concentration of solar facilities within a node.
- » The water requirement for a solar PV facility is negligible compared to the levels of water used by coal-based technologies and Concentrated Solar Power (CSP). 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. McTaggarts PV3 will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of McTaggarts PV3 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 in the development area within areas considered to be acceptable for the proposed development, the benefits of the project are expected to outweigh the environmental costs of the solar PV facility.

10.6. Overall Conclusion (Impact Statement)

The construction and operation of a solar PV facility with a contracted capacity of up to 75MW on a broader study area located near Upington in the Kai !Garib Local Municipality, of the greater ZF Mgcawu District Municipality has been proposed by McTaggarts PV3 (Pty) Ltd. A technically viable development area and development footprint was proposed by the proponent and assessed as part of the BA process. The assessment of the development footprint within the development area was undertaken by independent specialists and their findings have informed the results of this BA Report.

The specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of McTaggarts PV3 within the development area. However, sensitive features of a very high sensitivity will be impacted by the placement of linear infrastructure, including a small section of an internal access road. This placement of linear infrastructure across features of a very high sensitivity is considered as acceptable. Poorly developed drainage lines which are rated as features of a high sensitivity are located within areas proposed for the placement of PV panels and the development of the on-site facility substation. The placement of PV panel infrastructure within these features is considered to be acceptable from an ecological and avifauna perspective, based on the development footprint assessed within this BA Report and the avoidance of the larger and more significant drainage features. The position of the on-site substation is, however, recommended to be relocated outside of the buffer of the poorly development drainage line in order to reduce the risk of habitat loss and water quality related issues should any water flow occur during the life of the facility (i.e. as a substation stores oils, which could directly impact the aquatic feature). This will be undertaken during the micro-siting of the project and suitable placement of the on-site substation will be confirmed by an aquatic specialist during the required walkdown survey.

Based on the findings of independent specialist studies, the specialist recommendations provided and the suitability of the implementation of the development footprint assessed as part of this BA Report, it is recommended by the EAP that the development footprint of McTaggarts PV3 and the associated activities be authorised. The development footprint (i.e. facility layout) assessed within this BA Report is therefore considered to be the preferred development footprint for McTaggarts PV3, subject to the micro-siting of the facility infrastructure as required by the specialists. All impacts associated with the preferred layout can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures.

Through the assessment of the development of McTaggarts PV3 within the broader study area and development area, and the implementation of the preferred layout, it can be concluded that the development of the solar PV facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures).

10.7. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the preferred development footprint proposed by the proponent, the avoidance of the high 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 McTaggarts PV3 is acceptable within the landscape and can reasonably be authorised (**Figure 10.3**). The development of McTaggarts PV3 within the Upington REDZ is also supported by the Strategic Environmental Assessment (SEA) undertaken by the CSIR on behalf of DEA for the determination of the REDZ focus areas.

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

- » Arrays of PV panels with a contracted capacity of up to 75MW.
- » Centralised inverters or string inverters;

- » A temporary laydown area;
- » Cabling between the project components, to be laid underground where practical.
- » On-site inverters to convert the power from a direct current (DC) to an alternating current (AC).
- » A 22kV or 33kV/132kV on-site substation of up to 1ha in extent to facilitate the connection between the solar PV facility and the electricity grid;
- » An access road to the development area with a maximum width of 6m;
- » Internal access roads within the PV panel array area with a maximum width of 5m; and
- » Operation and Maintenance buildings, including a gate house and security building, control centre, offices, warehouses, a workshop and visitors centre.

The following key conditions would be required to be included within the authorisation issued for McTaggart PV3:

- » All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D to K**, are to be implemented.
- » The EMPr as contained within **Appendix M** of this BA Report should form part of the contract with the Contractors appointed to construct and maintain the solar PV facility in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of McTaggart PV3 is considered key in achieving the appropriate environmental management standards as detailed for this project.
- » The location of the on-site facility substation must be relocated, outside of the high sensitivity feature. The relocation must be approved by an aquatic specialist during the walkdown survey required from an aquatic perspective.
- » Following the final design of McTaggart PV3, a final layout must be submitted to DEA for review and approval prior to commencing with construction.
- » A pre-construction walk-through of the final development footprint for species of conservation concern that would be affected and that can be translocated must be undertaken prior to the commencement of the construction phase.
- » Before construction commences individuals of listed species within the development footprint that would be affected, must be counted and marked and translocated, where deemed necessary by the ecologist conducting the pre-construction walk-through survey. Permits from the relevant national and provincial authorities, i.e. the Northern Cape Department of Environment and Nature Conservation (DENC) and the Department of Agriculture, Forestry and Fisheries (DAFF), must be obtained before the individuals are disturbed.
- » The necessary water use authorisation must be obtained from the Department of Water and Sanitation (DWS) for impacts to a watercourse prior to construction.
- » A comprehensive rehabilitation plan must be implemented within watercourse areas from the project onset to ensure a net benefit to the aquatic environment. This should form part of the suggested walk down as part of the final EMPr preparation.
- » The final project footprint must be kept as small as possible and must consider all sensitive environmental features not considered to be suitable for development (as identified by the respective specialists).
- » A Chance Find Protocol must be developed and implemented in the event that archaeological or palaeontological resources are found. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately.

- » The environmental authorisation sought through this application and BA process is for a 10-year period as McTaggarts PV3 would need to be selected as Preferred Bidder by the Department of Energy (DoE).

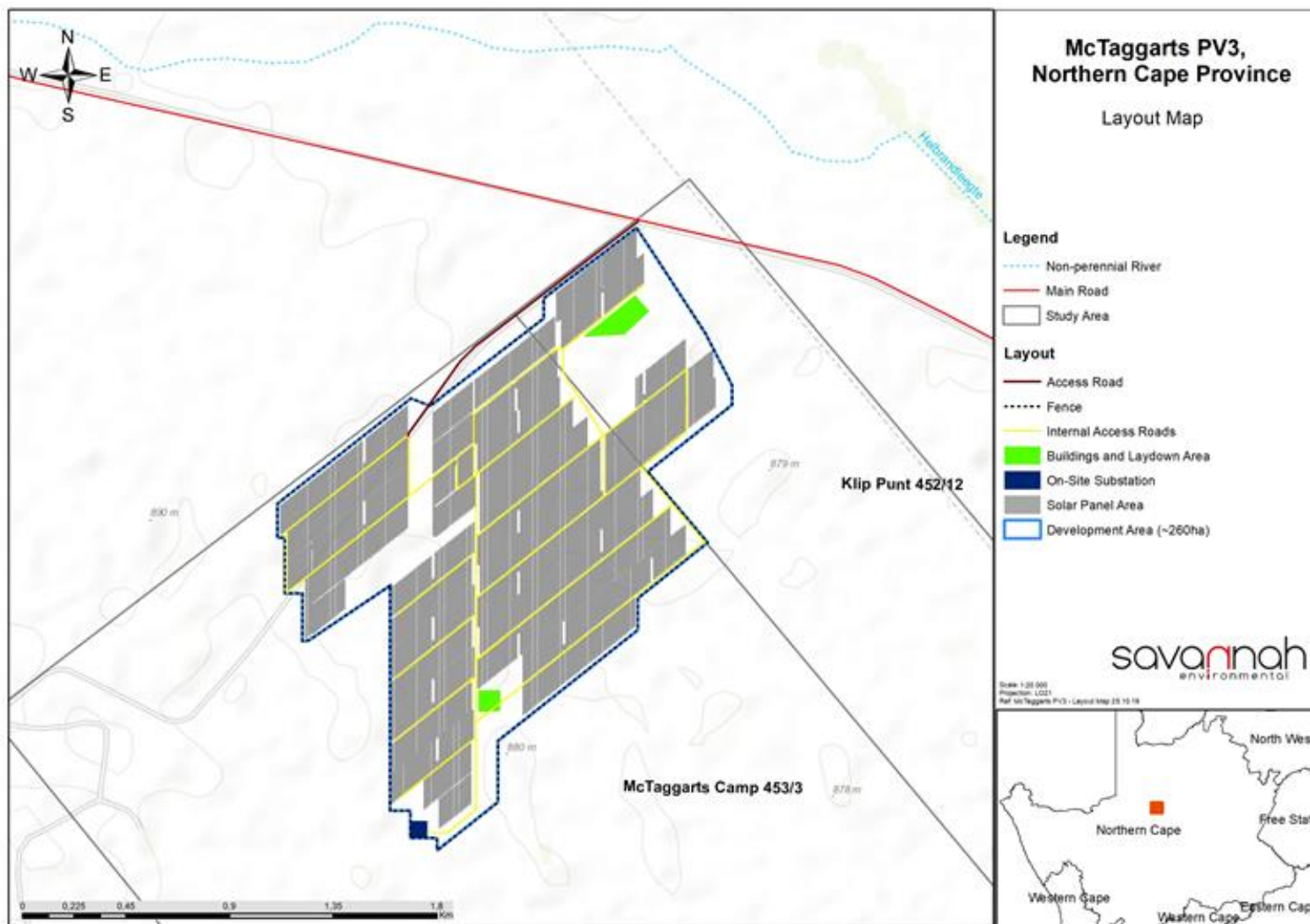


Figure 10.3: Preferred layout map of the preferred development footprint for McTaggarts PV3, as was assessed as part of the BA process (A3 map included in Appendix O)

CHAPTER 11: REFERENCES

Ecological Impact Assessment

Alexander, G. & Marais, J. 2007. A Guide to the Reptiles of Southern Africa. Struik Nature, Cape Town.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & de Villiers, M. S. 2014. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. *Strelitzia* 32. SANBI, Pretoria.

Branch W.R. 1998. Field guide to snakes and other reptiles of southern Africa. Struik, Cape Town.

Du Preez, L. & Carruthers, V. 2009. A Complete Guide to the Frogs of Southern Africa. Struik Nature., Cape Town.

EWT & SANBI, 2016. Red List of Mammals of South Africa, Lesotho and Swaziland. EWT, Johannesburg.

Marais, J. 2004. Complete Guide to the Snakes of Southern Africa. Struik Nature, Cape Town.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.

Mucina L. & Rutherford M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

Oosthuysen, E. & Holness, S. 2016. Northern Cape Critical Biodiversity Areas (CBA) Map. Northern Cape Department of Environment and Nature Conservation & Nelson Mandela Metropolitan University. Available at SANBI BGIS <http://bgis.sanbi.org/>.

Skinner, J.D. & Chimimba, C.T. 2005. The mammals of the Southern African Subregion. Cambridge University Press, Cambridge.

Avifauna Impact Assessment

BirdLife International. 2018. State of the world's birds: taking the pulse of the planet. BirdLife International, Cambridge.

BirdLife South Africa. 2018. Checklist of birds in South Africa. BirdLife South Africa, Johannesburg.

DeVault, T.L., Seamans, T.W., Schmidt, J.A., Belant, J.L., & Blackwell, B.F. 2014. Bird use of solar photovoltaic installations at US airports: Implications for aviation safety. *Landscape and Urban Planning* 122: 122–128.

Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V. & Brown, C.J. (eds). 1997. The atlas of southern African birds. Vol. 1 & 2. BirdLife South Africa, Johannesburg.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (eds). 2005. Roberts Birds of Southern Africa, 7th edition. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Jenkins, A.R., Ralston-Paton, S. & Smit-Robinson, H.A. 2017. Birds and solar energy. Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. Birdlife South Africa, Johannesburg.

Jenkins, A.R., Shaw, J.M., Smallie, J.J., Gibbons, B., Visagie, R. & Ryan, P.G. 2011. Estimating the impacts of power line collisions on Ludwig's Bustards *Neotis ludwigii*. *Bird Conservation International* 21: 303–310.

Jenkins, A.R., Smallie, J.J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. *Bird Conservation International* 20: 263-278.

Kagan, R.A., Verner, T.C., Trail, P.W. & Espinoza, E.O. 2014. Avian mortality at solar energy facilities in southern California: a preliminary analysis. Unpublished report National Fish & Wildlife Forensics Laboratory, USA.

Lehman, R.N., Kennedy, P.L. & Savidge, J.A. 2007. The state of the art in raptor electrocution research: A global review. *Biological Conservation* 136: 159-174.

Lovich, J.E. and J.R. Ennen. 2011. Wildlife conservation and solar energy development in the desert southwest, United States. *BioScience* 61: 982-992.

Marnewick, M.D., Retief, E.F., Theron, N.T., Wright, D.R. & Anderson, T.A. 2015. Important Bird and Biodiversity Areas of South Africa. Birdlife South Africa, Johannesburg.

Martin, G.R. & Shaw, J.M. 2010. Bird collisions with power lines: Failing to see the way ahead? *Biological Conservation* 143: 2695-2702.

Moore-O'Leary, K.A., Hernandez, R.R., Johnston, D.S., Abella, S.R., Tanner, K.E., Swanson, A.C., Kreidler, J., Lovich, J.E. 2017. Sustainability of utility-scale solar energy - critical ecological concepts. *Frontiers in Ecology and the Environment* 15: 385-394.

Mucina L. & Rutherford M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Rudman, J., Gauché, P., Esler, K.J. 2017. Direct environmental impacts of solar power in two arid biomes: An initial investigation. *South African Journal of Science* 113(11/12), Art. #2017-0113, 13 pages. <http://dx.doi.org/10.17159/sajs.2017/20170113>

Shaw, J.M. 2013. Power line collisions in the Karoo: conserving Ludwig's Bustard. Unpublished PhD thesis, University of Cape Town, Cape Town.

Smith, J.A., & Dwyer, J.F. 2016. Avian interactions with renewable energy infrastructure: an update. *Condor* 118: 411-423.

Southern African Bird Atlas Project 2 (SABAP2). <http://sabap2.adu.org.za> Accessed October 2018.

Taylor, M.R., Peacock, F. & Wanless, R.W. (eds) 2015. The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa, Johannesburg.

Taylor, P.B., Navarro, R.A., Wren-Sargent, M., Harrison, J.A. & Kieswetter, S.L. (eds) 1999. TOTAL CWAC Report: Coordinated Waterbird Counts in South Africa, 1992-1997. Avian Demography Unit, University of Cape Town, Cape Town.

Visser, E. 2016. The impact of South Africa's largest photovoltaic solar energy facility on birds in the Northern Cape, South Africa. Unpublished MSc thesis, University of Cape Town, Cape Town.

Visser, E., Perold, V., Ralston-Paton, S., Cardenal, A.C., & Ryan, P.G. 2018. Assessing the impacts of a utility-scale photovoltaic solar energy facility on birds in the Northern Cape, South Africa. *Renewable Energy* 133: 1285-1294.

Walston, L.J., Rollins, K.E., LaGory, K.E., Smith, K.P. & Meyers, S.A. 2016. A preliminary assessment of avian mortality at utility-scale solar energy facilities in the United States. *Renewable Energy* 92: 405-414.

Young, D.J., Harrison, J.A., Navarro, R.A., Anderson, M.A. & Colahan, B.D. 2003. Big birds on farms: Mazda CAR report 1993-2001. Avian Demography Unit, Cape Town.

Aquatic Resources Impact Assessment

Agenda 21 – Action plan for sustainable development of the Department of Environmental Affairs and Tourism (DEAT) 1998.

Agricultural Resources Act, 1983 (Act No. 43 of 1983).

Berliner D. and Desmet P. 2007. Eastern Cape Biodiversity Conservation Plan: Technical Report. Department of Water Affairs and Forestry Project No 2005-012, Pretoria. 1 August 2007.

Department of Water Affairs and Forestry - DWAF (2005). A practical field procedure for identification and delineation of wetland and riparian areas Edition 1. Department of Water Affairs and Forestry, Pretoria. Updated with amendments in 2007.

Germishuizen, G. and Meyer, N.L. (eds) (2003). Plants of southern Africa: an annotated checklist. *Strelitzia* 14, South African National Biodiversity Institute, Pretoria.

Holness, S & Oosthuysen, E. 2016. Northern Cape Critical Biodiversity Area map, SANBI BGIS.

Kleynhans C.J., Thirion C. and Moolman J. (2005). A Level 1 Ecoregion Classification System for South Africa, Lesotho and Swaziland. Report No. N/0000/00/REQ0104. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria.

Macfarlane, D.M. & Bredin, I.P. 2017. Buffer Zone Guidelines for Rivers, Wetlands and Estuaries Buffer Zone Guidelines for Rivers, Wetlands and Estuaries. WRC Report No TT 715/1/17 Water Research Commission, Pretoria.

Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), as amended.

National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

National Water Act, 1998 (Act No. 36 of 1998), as amended

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Pool-Stanvliet, R., Duffell-Canham, A., Pence, G. & Smart, R. 2017. The Western Cape Biodiversity Spatial Plan Handbook. Stellenbosch: CapeNature.

Soils and Agricultural Potential Impact Assessment

The Soil Classification Working Group (2018). Soil Classification – Taxonomic System for South Africa. Dept. of Agric., Pretoria.

Fey, M. (2010). Soils of South Africa. Cambridge. Cape Town.

Morgenthal, T.L., D.J. du Plessis, T.S. Newby and H.J.C. Smith (2005). Development and Refinement of a Grazing Capacity Map for South Africa. ARC-ISCW, Pretoria.

Heritage Impact Assessment (including archaeology and palaeontology)

Beaumont, P.B., 2004. Kathu Pan and Kathu Townlands/Uitkoms. In: Beaumont, P.B., Morris, D. (Eds.), Archaeology in the Northern Cape: Some Key Sites. McGregor Museum, Kimberley, pp. 50-52.

Cornell, D.H., Thomas, R.J., Moen, H.F.G., Reid, D.L., Moore, J.M., Gibson, R.L., 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 325-379.

De Wit, M.C.J., Bamford, M.K. 1993. Fossil wood from the Brandvlei area, Bushmanland, as an indication of palaeoenvironmental changes during the Cainozoic. *Palaeontologia africana* 30, 81-89.

De Wit, M.C.J., Marshall, T.R., Partridge, T.C., 2000. Fluvial depoists and drainage evolution. In: Partridge, T.C., & Maud, R.R. (Eds), *The Cainozoic of Southern Africa*. Oxford University Press, New York, 55-72.

De Wit, M.C.J. Ward, J.D., Bamford, M.K., Roberts, M., 2009. The significance of the Cretaceous Diamondiferous gravel deposit at Mahura Muthla in the Vryburg District of the Northern Cape Province in South Africa. *South African Journal of Geology* 112, 89-108.

Dingle, R.V., Hendey, Q.B., 1984. Late Mesozoic and Tertiary sediment supply to the eastern Cape Basin (S.E. Atlantic) and palaeo-drainage systems in southwestern Africa. *Marine Geology* 56, 13-26.

Partridge, T.C., Botha, G.A., Haddon, I.G., 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 585-604.

Pickford, M., Senut, B., Mein, P., Morales, J., Soria, D., Neito, M., Ward, J., Bamford, M. 1995. The discovery of Lower and middle Miocene vertebrates at Auchas, southern Namibia. *Comptes Rendus de l' Académie des Sciences.*, Paris, Ser IIa, 322,901-906.

Plumstead, E.P., 1969. Three thousand million years of plant life in Africa. Geological Society of southern Africa, Annexure to Volume LXXII. 72pp + 25 plates.

Walker, S.J.H., Lukich, V., Chazan, M., 2014. Kathu Townlands: A high density Earlier Stone Age locality in the interior of South Africa. *PLoS ONE* 9(7):

Visual Impact Assessment

Clifford, K.H., Ghanbari, C.M. & Diver, R.B. 2009. Hazard analysis of glint and glare from concentrating solar power plants. Proceedings of the SolarPACES Conference. 15-18 September 2009. Berlin, Germany.

Clifford, H.H., Ghanbari, C.M. & Diver, R.B. 2011. Methodology to assess potential glint and glare hazards from concentrating solar power plants: analytical models and experimental validation. *Journal of Solar Engineering Science*. 133: 1-9.

Federal Aviation Administration, April 2018. Technical Guidance for Evaluating Selected Solar Technologies on Airports

Landscape Institute and Institute of Environmental Management Assessment. 2013. Guidelines for landscape and visual impact assessment. Oxon, UK:Routledge

Oberholzer, B., 2005. Guidelines for involving visual and aesthetic specialists in EIA processes: Edition 1. (CSIR Report No. ENV-S-C 2005 053 F). Cape Town, South Africa: Provincial Department of the Western Cape, Department of Environmental Affairs & Development Planning.

United States Department of Interior. 2013. Best management practices for reducing visual impacts of renewable energy facilities on BLM-administered lands. Wyoming, United States of America: Bureau of Land Management.

Low, A.B. & Rebelo, A.G. (eds), 1996, *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs & Tourism, Pretoria.

Mucina, L. & Rutherford, M.C. (eds.), 2006, *The vegetation of South Africa, Lesotho and Swaziland*, South African National Biodiversity Institute, Pretoria (Strelitzia series; no. 19).

Social Impact Assessment

Department of Energy (DoE). (2008). National Energy Act (No. 34 of 2008). Republic of South Africa.

Department of Energy (DoE). (2011). National Integrated Resource Plan for Electricity 2010-2030. Republic of South Africa.

Department of Energy (DoE). (2003). White Paper on Renewable Energy. Republic of South Africa.

Department of Environmental Affairs (DEA). (1998). National Environmental Management Act 107 of 1998 (No. 107 of 1998). Republic of South Africa.

Department of Environmental Affairs (DEA). (2010). National Climate Change Response Green Paper. Republic of South Africa.

Department of Justice (DoJ). (1996). The Constitution of the Republic of South Africa (Act 108 of 1996). ISBN 978-0-621-39063-6. Republic of South Africa.

Department of Minerals and Energy (DME). (1998). White Paper on Energy Policy of the Republic of South Africa. Republic of South Africa.

Environmental Planning and Design. (2019). Landscape and Visual Impact Assessment for the proposed McTaggart PV3, near Upington in the Northern Cape Province.

International Finance Corporation (IFC). (2007). Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets. International Finance Corporation: Washington.

Interorganizational Committee on Principles and Guidelines for Social Impact Assessment. US Principles and Guidelines – Principals and guidelines for social impact assessment in the USA. Impact Assessment and Project Appraisal, 21 (3): 231-250.

Kai !Garib Local Municipality. (2018). Kai !Garib Local Municipality Draft Integrated Development Plan 2018 / 2019.

National Development Agency (NDA). (2014). Beyond 10 years of unlocking potential. Available from: http://www.nda.org.za/?option=3&id=1&com_id=198&parent_id=186&com_task=1

National Planning Commission. (2012). National Development Plan 2030. ISBN: 978-0-621-41180-5. Republic of South Africa.

Northern Cape Provincial Government. (2012). Northern Cape Provincial Spatial Development Framework (PSDF) 2012.

Savannah Environmental (2014). Final Environmental Impact Assessment Report for the Sirius Solar PV Project One, Northern Cape Province.

Statistics South Africa. (2011). Census 2011 Community Profiles Database. Pretoria.

TerraAfrica Consult cc. (2019). Soil, Land Use, Land Capability and Agricultural Potential Assessment for the proposed McTaggarts PV3, Northern Cape Province.

United Nations Environment Programme (UNEP). (2002). EIA Training Resource Manual. 2nd Ed. UNEP.

United Nations Economic and Social Commission for Asia and the Pacific (UN). (2001). Guidelines for Stakeholders: Participation in Strategic Environmental Management. New York, NY: United Nations.

Vanclay, F. (2003). Conceptual and methodological advances in Social Impact Assessment. In Vanclay, F. & Becker, H.A. 2003. The International Handbook for Social Impact Assessment. Cheltenham: Edward Elgar Publishing Limited.

ZF Mgcawu District Municipality. (2018). ZF Mgcawu District Municipality Draft Integrated Development Plan (IDP) 2017 – 2022 (2018 / 2019)

Traffic Impact Assessment

SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa

Road Safety Act (Act No. 93 of 1996)

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