

BRAKPAN 1 SOLAR ENERGY FACILITY

Western Cape Province

Basic Assessment Report

June 2022

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PROJECT DETAILS

Title	:	Basic Assessment Report for the Brakpan 1 Solar Energy facility, Western Cape Province.
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Client	:	Brakpan 1 Solar Energy facility (Pty) Ltd
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PURPOSE OF THE BASIC ASSESSMENT REPORT AND INVITATION TO COMMENT

Brakpan 1 Solar Energy facility is proposing the development of a solar PV facility and associated infrastructure on a site located approximately 15km north-west of Nelspoort and 60km south-west of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The project is to be known as Brakpan 1 Solar Energy facility and will have a contracted capacity of up to 190MW.

As the project has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction of the project. As the project falls within the Renewable Energy Development Zone (REDZ) 11 (the Beaufort West REDZ), a Basic Assessment (BA) process is applicable as per GNR114 of February 2018.

This BA Report describes and assesses this proposed project and consists of the following chapters:

- » **Chapter 1** provides background to Brakpan 1 Solar Energy facility and the BA process.
- » **Chapter 2** provides a description of Scope of the Brakpan 1 Solar Energy facility, including identified project alternatives.
- » **Chapter 3** outlines strategic regulatory and legal context for energy planning in South Africa and specifically for Brakpan 1 Solar Energy facility.
- » **Chapter 4** provides a motivation for the need and desirability of the proposed project.
- » **Chapter 5** outlines the approach to undertaking the BA process.
- » **Chapter 6** describes the existing biophysical and social environment within and surrounding the broader study and development area.
- » **Chapter 7** 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 8** provides an assessment of the potential cumulative impacts.
- » **Chapter 9** presents the conclusions and recommendations based on the findings of the BA Report.
- » **Chapter 10** provides references used in the compilation of the BA Report.

Basic Assessment Reports in support of the Application for Environmental Authorisation for each project have been compiled and are available for review and comment from **Friday, 03 June 2022 to Thursday, 07 July 2022**. The availability of the BA Report for the grid connection infrastructure for a 30-day review and comment period will be from **Wednesday, 08 June 2022 to Thursday, 14 July 2022**. The reports are available at the Savannah Environmental online stakeholder engagement platform at (<https://savannahsa.com/public-documents/energy-generation/>). Reports for Brakpan 2 Solar Energy Facility and Belvedere Solar Energy facility will be available at a later date.

Please submit your comments by the **07 July 2022** or the **14 July 2022** to:

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EXECUTIVE SUMMARY

Brakpan 1 Solar Energy Facility (Pty) Ltd. the ("Independent Power Producer") proposes to develop the Brakpan 1 Solar Energy Facility and its associated electrical infrastructure (the "Project/Facility") approximately 15km north-west of Nelspoort and 60km south-west of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The Project site is located within the Beaufort West Renewable Energy Development Zone ("REDZ 11") and the Central Transmission Corridor. The facility is to be developed with a maximum installed capacity of 220 MW and will have a generating capacity of 190 MW.

The Project is earmarked for submission into the South African Government's Renewable Independent Power Producer Procurement Programme ("REIPPPP") or for a Private Off-take.

The Project (Brakpan 1 Solar Energy Facility) is part of a cluster known as the Poortjie Wes Cluster (the "Cluster"). The Cluster entails the development of six (6) solar energy facilities. All six (6) renewable energy ("RE") facilities will connect to the proposed 132kV Belvedere Collector Switching Station (the "Collector Switching Station") via 132kV Overhead Lines ("OHLs"). The proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILO MTS ("Poortjie Wes LILO MTS") via a 132kV OHL.

A technically suitable project site of ~450ha has been identified by Brakpan 1 Solar Energy Facility (Pty) Ltd for the establishment of the PV facility. The project site is located on the following property:

- » The Farm Poortjie No. 76, in the Kamdeboo Municipality, division of Murraysburg, Western Cape Province; and
- » Portion 2 of the Farm Belvedere Nr. 73, in the Beaufort West Municipality, division of Murraysburg, Province of the Western Cape.

The development footprint for the facility allowing the facility to generate 190MWac will be approximately 395ha and will contain the following infrastructure: The

(1) Solar Facility

- » PV modules (mono or bifacial);
- » Single axis tracking structures, Fixed Axis Tracking, or Fixed Panels;
- » Fixed tilt mounting structure (to be considered during the design phase of the facility);
- » Galvanised steel and/or aluminium solar module mounting structures;
- » Solar module substructure foundations. These will likely be drilled into the ground, filled with concrete and then have posts fixed inside them. Alternately, ramming may be used; and
- » 60 to 65 Central Inverter stations.

(2) Building Infrastructure

- » Offices;
- » Operational and maintenance control centre;
- » Warehouse/workshop;
- » Panel maintenance and cleaning area;
- » Ablution facilities;
- » A conservancy tank for storage of sewage underground with a capacity of up to 35m³; and
- » Guard Houses.

(3) Associated Infrastructure

- » On-site substation building - IPP owned (including lightening conductor poles);
- » Eskom switching station, to be handed over to Eskom at Commercial Operation Date ("COD") (this forms part of a separate BA);
- » Battery storage (500MW/500MWh);
- » Internal distribution lines of up to 33 kV;
- » Underground low voltage cables or cable trays;
- » Internal gravel roads;
- » Fencing;
- » Stormwater channels;
- » Temporary work area during the construction phase; and an
- » Access road to site from the existing District gravel road between Nelspoort and Murraysburg No. MR 587.

A development area of 450ha has been identified within the project site by the proponent for the development of the Brakpan 1 Solar Energy facility and associated infrastructure (**Figure 1**). The identification of this development area considered technical and environmental constraints in the larger property in line with a typical mitigation hierarchy. The development area has been fully considered within this BA process and assessed in terms of its suitability from an environmental and social perspective.

The Ecological Importance of the development area is regarded as Medium, specifically from a fauna biodiversity and habitat perspective. However, the location of the development area has achieved an acceptable extent of avoidance within the project site, which will not result in unacceptable residual impacts. 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.

From the specialist studies undertaken it was determined that soils and agricultural aspects did not require detailed assessment (refer to **Appendix F**). The most sensitive soil forms that can be expected for the area include the Hutton and Oakleaf soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low to Moderate" sensitivities, which correlates with the requirements for a compliance statement only. The available climate can limit crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area. The area is not favourable for most cropping practices. It is worth noting that, additional baseline soil field assessments can provide a better understanding of the soil or land potentials for the project area. It is the specialist's opinion that the proposed solar renewable energy project based on the DAFF (2017) land capability sensitivity of the area will have a limited impact on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed solar renewable energy project development may be favourably considered.

The potential environmental impacts associated with Brakpan 1 Solar Energy Facility identified and assessed through the BA process include:

- » Impacts on ecology, flora, and fauna
- » Impacts on avifauna

- » Impacts on heritage resources, including archaeology, palaeontology, and cultural landscape
- » Visual impacts on the landscape as a result of the project
- » Positive and negative social impacts
- » Impacts on traffic.

Impacts on Ecology

The aim of the Biodiversity Impact Assessment (**Appendix D**) was to provide information to guide the risk of the proposed Brakpan 1 Solar Energy Facility to the ecosystems affected by its development and their inherent fauna and flora. Based on the latest available ecologically relevant spatial data the following information is pertinent to the project area:

- » It is recognised as an Other Natural Area and Ecological Support Area as per the Western Cape Biodiversity Spatial Plan;
- » The Combined Animal Species Theme Sensitivity was rated as 'Moderate' according to the Environmental Screening Tool;
- » The Ecosystem Protection Level for the vegetation type associated with the development footprint is regarded as Poorly Protected; and
- » It is regarded as an Upstream Management Area according to the NFEPA database.

The habitat physiognomy within the project area is not diverse and is considered to be fairly homogenous. However, based on the fauna components recorded within the project area and proximal landscape, the area provides important ecosystem services, particularly with regard to the maintenance of dynamic soil properties and nutrient cycling. The Site Ecological Importance (SEI) of the study area was determined to be 'High' based on the high likelihood of occurrence for NT species, the extent of the area considered and its connectivity to natural areas within the landscape, and the low resilience of the vegetation type.

The main expected impacts of the proposed Brakpan 1 Solar Facility will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, the project possesses a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted. Moreover, the avoidance and minimisation mitigation measures are the most important with respect to the mitigation hierarchy.

To evaluate the extent of 'avoidance' achieved for the project, the following is noteworthy:

- » The footprint areas for the four proposed solar facilities proposed as part of the Poortjie Wes Cluster amounts to 1 144.645 ha; and
- » The total extent of the entire property area comprises 49 337.900 ha, thus approximately 2% of the property area will be developed.

The project area has been designated as a REDZ (Renewable Energy Development Zone) and taking into consideration the extent of 'avoidance' achieved for the project, it is the opinion of the specialist that the authorisation of the proposed project may be favourably considered. It is recommended that should any other future developments be proposed for the remaining extent of any 'Very High' or 'High' SEI areas within the associated properties, offset strategies be required for these authorisations.

The PAOI is located within an Upstream Management Area according to the NFEPA database. There are two minor ephemeral drainage lines that traverse the PAOI. However, the channel physiognomy of these drainage systems was not considerably distinct from the terrestrial component and could be regarded as an arid dendritic network. These systems were identified by the distinct soil of the preferential flow paths and the presence of *Vachellia karoo*.

A 50 m buffer was applied to these drainage systems (Macfarlane et al, 2009) as they are regarded as Ecological Support Areas and during surface flow would be important in the distribution of propagules.

The following Zones of Regulation ("ZoR") apply to the drainage lines identified within the PAOI:

- » A 32 m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) should be assigned to the drainage lines; and
- » A 100 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) should be assigned to the drainage lines.

The proposed solar facility is expected to pose a low residual risk to the delineated drainage lines, with key mitigation being the avoidance and adherence to the recommended buffer widths. Due to the low residual risk, a General Authorisation is required for the required water use authorisation.

Impacts on Avifauna

In terms of the findings of the Avifauna Assessment (refer to **Appendix E**) the proposed development site appears to be well suited for the development of renewable energy facilities as proposed. The proposed development site is located outside of major avifaunal sensitivities and does not represent unique avifaunal habitat in the context of the broader area. The available habitat across the site is already modified through grazing pressure and is located relatively close to existing overhead transmission lines, which translates into a reduced length of novel overhead power line required for the grid connection, reducing the potential impact on species susceptible to collisions with transmission lines such as bustards, cranes, and storks in the area.

The proposed development is unlikely to have a significant negative impact on the long-term viability or persistence of avifaunal species in the area and therefore can be approved from an avifaunal perspective.

Impacts on Heritage (including archaeology and palaeontology)

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social, and scientific reasons. The site possesses several landscape elements contributing to a composite cultural landscape. Significant from a landscape perspective is the distinctive poort and its associated dam, linkage route, and topographical condition. The area is of medium to high sensitivity in terms of the placement of renewable energy infrastructure. The principle of locating PV infrastructure in this environment is acceptable especially if occurring on the flatlands and lower slopes and avoiding the immediate landscape setting of the poort.

No archaeological resources of significance were identified within the area proposed for development although the broader area has archaeological significance in terms of the sensitive dolerite outcrops in the area (**Appendix G**). No impacts on significant archaeological heritage are anticipated.

Five observations of palaeontological significance were noted within the area proposed for development. Three of these have higher levels of significance and are graded III B. These paleontological resources must be collected by a palaeontologist under an approved work plan before construction.

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of a renewable energy Facility in this location is supported from a heritage perspective provided that the infrastructure is located in areas able to tolerate the impact of the high degree of change from a cultural landscape perspective.

As such, the development of Brakpan 1 Solar Energy Facility is not associated with any fatal flaws from a heritage, archaeological and palaeontological perspective, and it is for this reason that the project is considered to be acceptable on the condition that the following recommendations are adhered to:

- » The recommendations of the VIA must be implemented.
- » Palaeontological observations 380, 381 and 385 must be collected by a palaeontologist before construction. This must be done under a workplan application in terms of section 38(8) to be submitted by a palaeontologist and approved by HWC
- » The HWC Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- » Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artifacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials, or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and HWC must be alerted immediately to determine an appropriate way forward.

Visual Impacts

The visual assessment (refer to **Appendix H**) of the proposed Brakpan 1 Solar Energy Facility indicates that the construction and operation of the proposed Facility will have a visual effect on both the rural landscape and on sensitive receptors in the study area. The proposed infrastructure will be visible within an area that is generally characterised by low-growing shrubland and wide-open undeveloped spaces. The infrastructure would thus be highly visible and impossible to hide within an area that incorporates potentially various sensitive visual receptors that may consider visual exposure to this type of infrastructure to be intrusive. The low occurrence of such sensitive visual receptors within this environment, specifically close to the proposed Facility, is of relevance, however, and has affected the significance rating of the anticipated visual impacts.

Overall, the post-mitigation significance of the visual impacts is predominately **low to negligible**. No visual impacts with a high residual significance are anticipated.

Notwithstanding the above, there are not many options as to the mitigation of the visual impact of the proposed infrastructure. No amount of vegetation screening or landscaping would be able to hide structures of these dimensions, especially within this receiving environment.

This assessment has adopted a risk-averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors (bar the landowners of the properties earmarked for the development), would be predominantly negative towards the Brakpan 1 Solar Energy Facility in the region. While still keeping in mind that there are also likely to be supporters of the Facility (as a possible employer and income generator in the region) amongst the population of the larger region, they are largely expected to be indifferent to the construction of the Facility and not as vocal in their support for the Facility as the detractors thereof.

Therefore, with the information available to the specialist at the time of writing this report, it cannot be empirically determined that the statistical majority of objecting stakeholders were exceeded. If evidence to the contrary surfaces during the progression of the development application, the specialist reserves the right to revise the statement below.

Therefore, the likelihood that the proposed development will be met with concern and objections from some of the affected sensitive receptors in the region, this report cannot categorically state that any of the above conditions were transgressed. As such these visual impacts are not considered to be fatal flaws for a development of this nature particularly due to the remote location of the study area and very low density of visual receptors. It is, therefore, suggested that the proposed Brakpan 1 Solar Energy Facility, as per the assessed layout be supported from a visual perspective, subject to the implementation of the suggested best practice mitigation measures provided in the specialist report.

Social Impacts

The findings of the SIA (**Appendix I**) indicate that the development of the proposed 220 MW Brakpan 1 PV SEF and associated infrastructure will create employment and business opportunities for locals in the BWM during both the construction and operational phase of the project.

The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented to maximise the potential benefits. The significance of this impact is rated as **High Positive**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the REIPP Procurement Programme has resulted in significant socio-economic benefits, both at a national level and local community level. These benefits are linked to foreign Direct Investment, local employment and procurement, and investment in local community initiatives. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure. The establishment of the proposed 220 MW Brakpan 1 PV SEF and associated infrastructure including a BESS is therefore supported by the findings of the SIA.

The enhancement and mitigation measures outlined in the SIA and other key specialist reports should be implemented.

Impacts on Traffic

The potential traffic and transport-related impacts for the construction and operation phases of the proposed Brakpan 1 Solar Energy Facility were assessed (refer to **Appendix J**). The following was concluded:

- » The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of **medium significance** before and of **low significance** after mitigation.
- » During operation, it is expected that maintenance and security staff will periodically visit the Facility. It is assumed that approximately 60 full-time employees will be stationed on-site (subject to change). The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- » The traffic generated during the decommissioning phase will be less than the construction phase traffic and the impact on the surrounding road network will also be considered negative and of **medium significance** before and **low significance** after mitigation.

The potential mitigation measures mentioned in the construction phase are:

- » Dust suppression
- » Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- » The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network by reducing the construction trips and the distance travelled to transport the materials to the site.
- » Staff and general trips should occur outside of peak traffic periods.
- » A “dry run” of the preferred route.
- » Design and maintenance of internal roads.
- » If required, any low hanging overhead lines (lower than 5.1 m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.

The construction and decommissioning phases of development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase. The duration of this phase is short term i.e., the impact of the traffic on the surrounding road network is temporary and a solar Facility, when operational, does not add any significant traffic to the road network.

Both the proposed access point and the access road to the Facility are deemed feasible from a traffic engineering perspective.

The development is supported from a transport perspective provided that the recommendations and mitigations contained in the specialist report (**Appendix J**) are adhered to.

The potential impacts associated with the proposed Brakpan 1 Solar Energy Facility and associated infrastructure are acceptable from a transport perspective and it is therefore recommended that the proposed Facility be authorised.

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. The most significant of these will be the contribution towards a reduction in greenhouse gas emissions and consequent assistance with climate change mitigation.

The alignment of renewable energy developments with the IRP 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 social and economic benefits of renewable energy developments at a local, regional, and national level have the potential to be significant. However, there is a lack of understanding of the cumulative impacts on other environmental and social receptors such as birds, visual amenity, and landscape character of the affected areas largely due to limited information on impacts from existing facilities within the country. This assessment is therefore qualitative.

The significance of the cumulative impacts associated with the development of the Brakpan 1 Solar Energy Facility is predominately low to medium, depending on the impacts being considered, although were found to be acceptable due to appropriate placement of infrastructure outside remaining high and very sensitive areas within the project site. A summary of the cumulative impacts is included in **Table 1**.

Table 1: Summary of the cumulative impact significance for Brakpan 1 Solar Energy Facility within the development area

Specialist assessment	The overall significance of the impact of the proposed project considered in isolation	Cumulative significance of the impact of the project and other projects in the area
Ecology	Medium	Medium
Avifauna	Medium	Medium
Heritage (archaeology and palaeontology)	Low	Low
Visual	Medium	Medium
Positive Social Impacts (Impacts on the local economy)	Low	High
Negative Social Impacts (Impacts on the sense of place and local services)	Low	Medium
Traffic	Low	Medium

Considering the findings of the cumulative specialist assessments undertaken for the project the following can be concluded considering the Brakpan 1 Solar Energy Facility:

- » There will be no unacceptable loss of biodiversity (vegetation, species types, and ecological processes) due to the degree of avoidance of the development area in relation to remaining high and very high areas of ecological importance within the broader project site and the region.
- » It is unlikely that the proposed development will result in a significant negative effect on the long-term viability or persistence of avifaunal populations in the area given the availability of suitable habitats for SCCs in the area.
- » The construction of the project will not result in the complete or whole-scale change in sense of place and character of the area nor will the project result in unacceptable visual intrusion.

- » The construction of the project will not result in an unacceptable loss of or impact on heritage resources. Impacts on the cultural landscape have been minimised through the appropriate placement of the facility on the site outside of sensitive landscape features.
- » The project will not significantly increase the negative impact on the social environment. However, an increase in positive impacts, specifically as a result of job creation and socio-economic benefits, can be expected.
- » The project will contribute towards a reduction in greenhouse gas emissions from energy generation and will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government has committed to becoming a signatory.

Based on a detailed evaluation, the cumulative impacts associated with the construction and operation of the proposed Brakpan 1 Solar Energy Facility and other proposed renewable energy facilities in the region are considered to be acceptable. The location of this project within the Beaufort West REDZ is considered to be a desirable location for further consideration provided that environmental impacts are mitigated to suitable standards as recommended within this BA Report.

Environmental Sensitivity

As part of the specialist investigations undertaken within the development area of Brakpan 1 Solar Energy Facility, specific environmental features were identified which will be impacted by the placement of the development footprint (i.e. project infrastructure) associated with the Facility. The current condition of the features identified (i.e. intact or disturbed) informed the sensitivity of the environmental features and the 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 1**. **Figure 2** is the final layout map for Brakpan 1 Solar Energy Facility considering environmental sensitivities. The features identified specifically relate to ecological and avifauna habitats. The following points describe the features present within the development area, as well as the surrounding area:

- » It is recognised as the Other Natural Area and Ecological Support Area as per the Western Cape Biodiversity Spatial Plan.
- » The Combined Animal Species Theme Sensitivity was rated as 'Moderate' according to the Environmental Screening Tool.
- » The Ecosystem Protection Level for the vegetation type associated with the development footprint is regarded as Poorly Protected.
- » Following the field investigations, the site was defined as having a High SEI based on faunal sensitivities.
- » It is regarded as an Upstream Management Area according to the NFEPA database.

- » Although largely outside of the development area the following avifauna features have been identified:
 - * One SCC recorded during either season was Ludwig's Bustard, and while this species was recorded on multiple occasions this may represent the same individual
 - * Avifaunal SCCs observed in the broader area include Martial Eagle, Lanner Falcon, Secretarybird, Blue Crane, Karoo Korhaan, Southern Black Korhaan, and Verreaux's Eagle.

Considering the features identified within the project site and development area, the specialists have indicated the acceptability of the proposed development. Given the degree of avoidance of the

development area of High and Very High areas of ecological importance within the project site as well as avoidance of the avifauna, buffers referred to above, the development may be considered acceptable as the residual impacts are expected to be of medium significance.

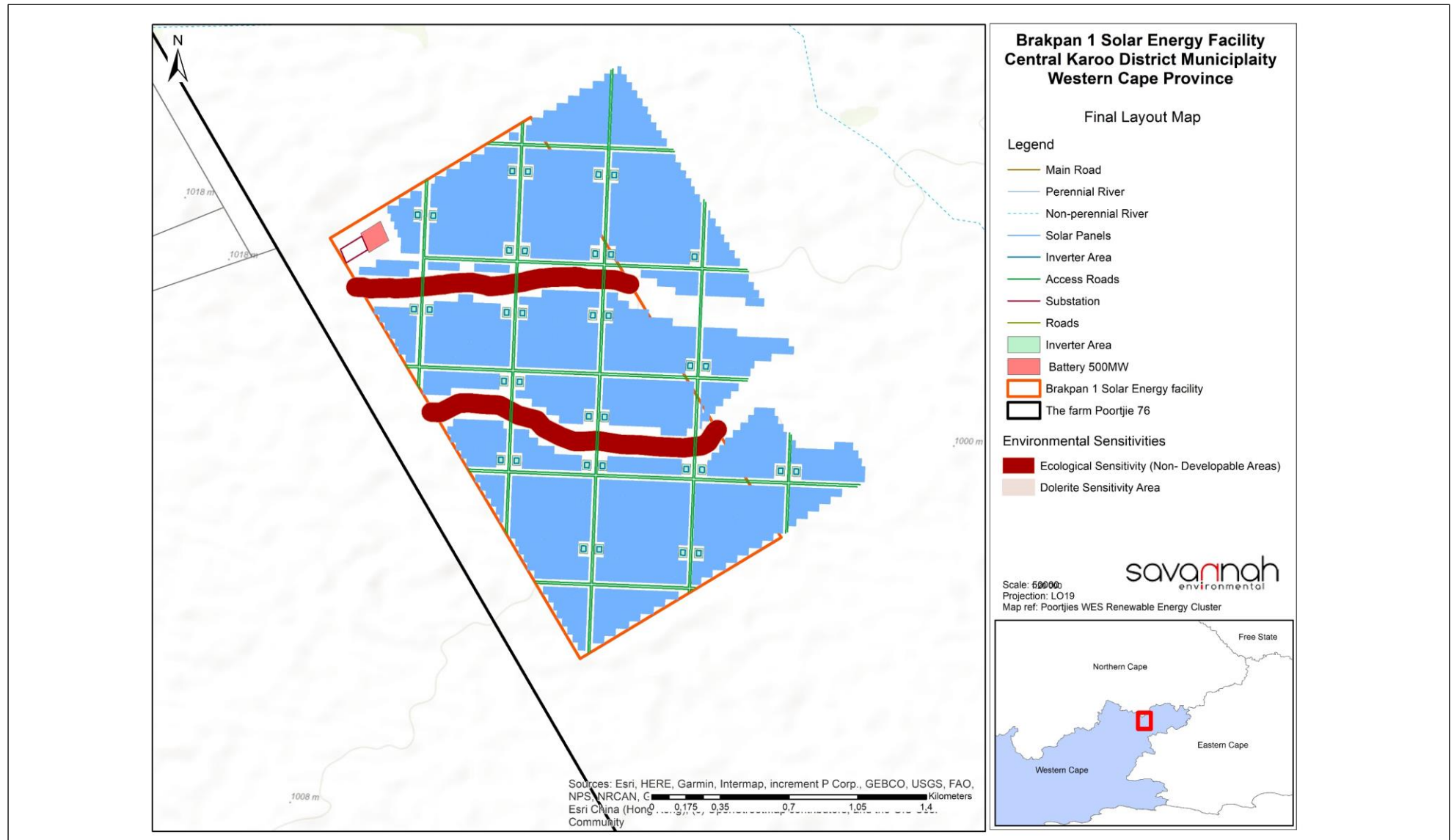


Figure 2: Layout map of the proposed Brakpan 1 Solar Energy facility

DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Site Ecological Importance (SEI): is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts). An understanding of residual risk to SEI is important in determining acceptability of impact

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

Waste: means—

- a) any substance, material, or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material

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

Watercourse: as per the National Water Act means -

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

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

ACRONYMS

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DEFF	Department of Environment, Forestry and Fisheries (National)
DWS	Department of Water and Sanitation
CBA	Critical Biodiversity Area
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DM	District Municipality
DMRE	Department of Mineral Resources Energy
EAP	Environmental Assessment Practitioner
EGIS	Environmental Geographic Information System
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
ESA	Ecological Support Area
GA	General Authorisation
GHG	Greenhouse Gas
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
LNG	Liquid Natural Gas
m	Metre
m ²	Square meters
m ³	Cubic meters
m amsl	Metres Above Mean Sea Level
MW	Megawatts
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM: AQA	National Environmental Management: Air Quality Act (No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)

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

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CHAPTER 1: INTRODUCTION

Brakpan 1 Solar Energy Facility (Pty) Ltd., the Independent Power Producer ("IPP") proposes to develop the Brakpan 1 Solar Energy Facility and its associated electrical infrastructure (the "Project/Facility") approximately 15km north-west of Nelspoort and 60km south-west of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The Project site is located within the Beaufort West Renewable Energy Development Zone ("REDZ 11") and the Central Transmission Corridor. The facility is to be developed with a maximum installed capacity of 220 MW and will have a generating capacity of 190 MW.

The Project is earmarked for submission into the South African Government's Renewable Independent Power Producer Procurement Programme ("REIPPPP") or for a Private Off-take.

A technically suitable project site of ~450ha in extent has been identified by Brakpan 1 Solar Energy Facility (Pty) Ltd. for the establishment of the PV facility. The project site is located on the following property:

» The Farm Poortjie No. 76, in the Kamdeboo Municipality, division of Murraysburg, Western Cape Province.

As the project has a potential to impact on the environment, the IPP has to obtain an Environmental Authorisation ("EA") . The project is located within a REDZ, as such the application is required to follow a Basic Assessment ("BA") process. Site-specific studies and assessments to be undertaken as part of the BA process will delineate areas of potential sensitivity within the proposed development footprint. Following the identification and confirmation of constraining factors, the layout of the solar PV facility can be planned to minimise social and environmental impacts. The location of the Brakpan 1 Solar Energy Facility development area is indicated in **Figure 1.1**.

The Project (Brakpan 1 Solar Energy Facility) is part of a cluster known as the Poortjie Wes Cluster (the "Cluster"). The Cluster entails the development of six (6) solar energy facilities. All six (6) solar facilities will connect to the proposed 132kV Brakpan 1 Collector Switching Station (the "Collector Switching Station") via 132kV Overhead Lines ("OHLs") or will connect directly to a new LILO MTS. The proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILO MTS ("Poortjie Wes LILO MTS") via a 132kV OHL. The location of the Poortjie Wes Cluster is indicated in **Figure 1.2**. Separate Environmental Impact Assessment ("EIA") processes are being undertaken for each solar facility and the grid connection infrastructure. This report considers only the Brakpan 1 Solar Energy Facility.

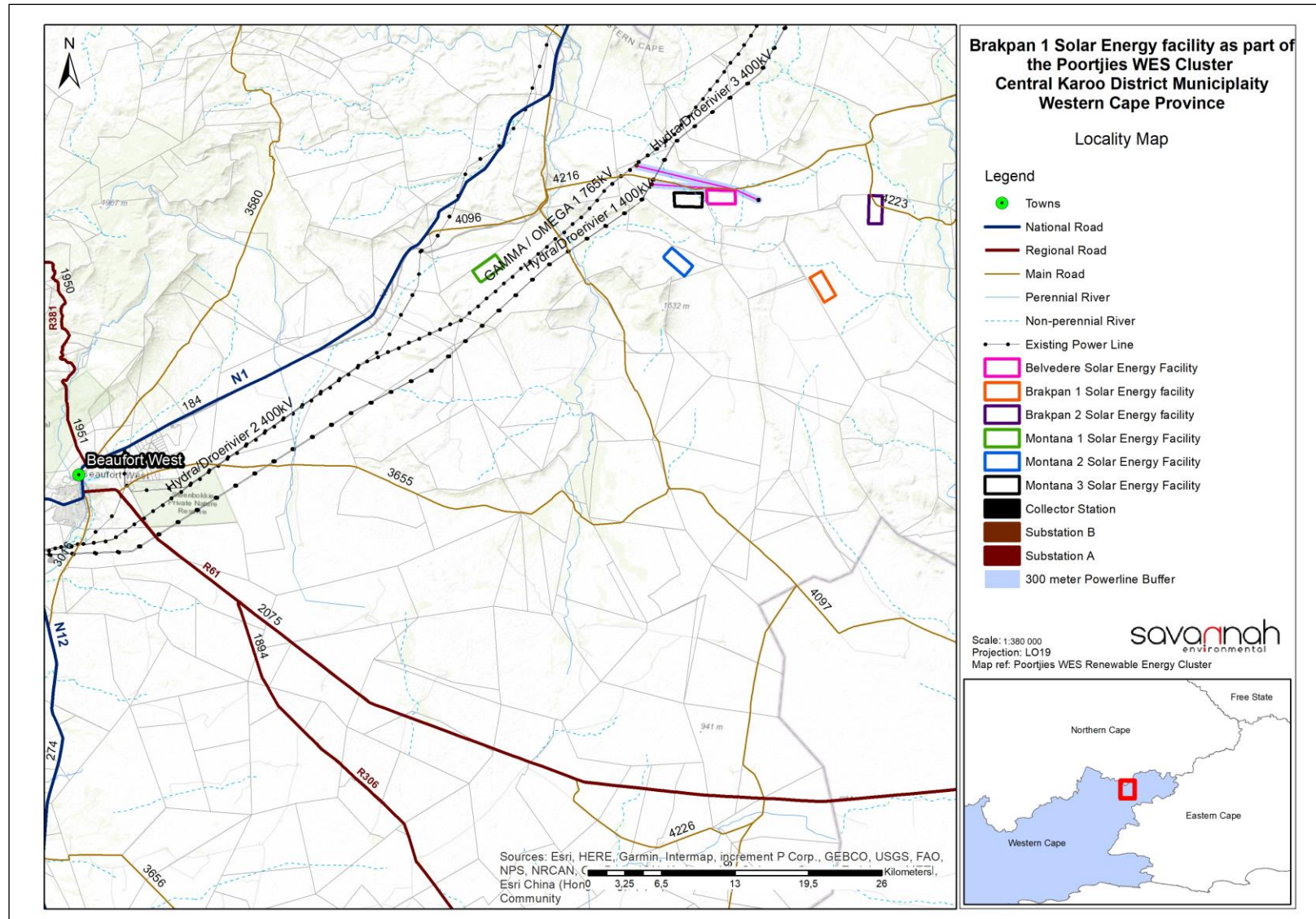


Figure 2.2: Locality map illustrating the Brakpan 1 Solar Energy Facility development area in relation to the proposed Poortjies Wes Cluster

1.1. 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 1.3 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 the property or properties.	A description of the location of the Brakpan 1 Solar Energy Facility is included in Table 1.1 and Figure 1.1 and Figure 1.2. 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 municipalities, ward, and current land zoning is also provided.

This BA Report describes and assesses this proposed project and consists of the following chapters:

- » **Chapter 1** provides background to Brakpan 1 Solar Energy Facility and the BA process.
- » **Chapter 2** provides a description of Scope of the Brakpan 1 Solar Energy Facility, including identified project alternatives.
- » **Chapter 3** outlines strategic regulatory and legal context for energy planning in South Africa and specifically for Brakpan 1 Solar Energy Facility.
- » **Chapter 4** provides a motivation for the need and desirability of the proposed project.
- » **Chapter 5** outlines the approach to undertaking the BA process.
- » **Chapter 6** describes the existing biophysical and social environment within and surrounding the broader study and development area.
- » **Chapter 7** 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 8** provides an assessment of the potential cumulative impacts.
- » **Chapter 9** presents the conclusions and recommendations based on the findings of the BA Report.
- » **Chapter 10** provides references used in the compilation of the BA Report.

1.2. Project Overview

The Integrated Resource Plan ("IRP") 2019 developed by the Department of Mineral Resources and Energy ("DMRE") indicates that South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. Renewable energy, including Solar PV and wind present an opportunity to diversify the energy mix, and to produce grid connected or distributed off-grid electricity. In order to achieve this diversified mix and harness the benefits of renewable energy, the IRP 2019 includes an allocation of 6000MW of new capacity to large scale PV.

From a regional perspective, the greater Central Karoo 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 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 Project site is located within the Beaufort West Renewable Energy Development Zone ("REDZ 11") earmarked for renewable energy developments and the Central Transmission Corridor of the Strategic Transmission Corridors.

It is in this context that the Brakpan 1 Solar Energy Facility is being proposed. Ultimately, the project is intended to be a part of the renewable energy projects portfolio for South Africa, as contemplated in the Integrated Resource Plan and Integrated Energy Plan.

The development footprint for the facility allowing the facility to generate 190MWac will be approximately 395ha and will contain the following infrastructure:

(4) Solar Facility

- » PV modules (mono or bifacial);
- » Single or double axis tracking structures, Fixed Axis Tracking, or Fixed Panels;
- » Fixed tilt mounting structure (to be considered during the design phase of the facility);
- » Galvanised steel and/or aluminium solar module mounting structures;
- » Solar module substructure foundations. These will likely be drilled into the ground, filled with concrete and then have posts fixed inside them. Alternately, ramming may be used; and
- » 60 to 65 Central Inverter stations.

(5) Building Infrastructure

- » Offices;
- » Operational and maintenance control centre;
- » Warehouse/workshop;
- » Panel maintenance and cleaning area;
- » Ablution facilities;
- » A conservancy tank for storage of sewage underground with a capacity of up to 35m³; and
- » Guard Houses.

(6) Associated Infrastructure

- » On-site substation building - IPP owned (including lightening conductor poles);
- » Eskom switching station, to be handed over to Eskom at Commercial Operation Date ("COD") (this forms part of a separate BA);
- » Battery storage (500MW/500MWh);
- » Internal distribution lines of up to 33 kV;
- » Underground low voltage cables or cable trays;
- » Internal gravel roads;
- » Fencing;
- » Stormwater channels;
- » Temporary work area during the construction phase; and an
- » Access road to site from the existing District gravel road, Minor Road OP9212. OP9212 is off District road No. MR 587, between Nelspoort and Murraysburg(also a gravel road).

Grid infrastructure to be built by the IPP will be owned and operated by Eskom Holdings (SOC) Ltd. ("Eskom"). This includes:

- » an onsite Switching Station;
- » a 132kV OHL from each facility's onsite Switching Station to the Collector Switching Station, or a 132kV OHL from the onsite Switching Station directly to the new Poortjie Wes 400/132kV LILLO MTS; and
- » a gravel service road beneath the 132 kV power line.

This forms part of a separate Basic Assessment process.

The table below provides an overview of the Brakpan 1 Solar Energy facility. The key infrastructure components associated with the development of Brakpan 1 Solar Energy facility are described in greater detail within Chapter 2 of this BA Report.

Table 1.1: Overview of the Brakpan 1 Solar Energy facility development area

Province	Northern Cape Province
District Municipality	Central Karoo District Municipality
Local Municipality	Beaufort West Local Municipality
Ward number(s)	Ward 2
Nearest town(s)	15km north-west of Nelspoort and 60km south-west of Beaufort West
Affected property of the PV development area: Farm name(s), number(s) and portion numbers	» The Farm Poortjie No. 76
SG 21 Digit Code (s)	C0520000000007600000
Current zoning of the study area	Agricultural (grazing)
Site Co-ordinates (corner co-ordinates of PV1)	Corner 1: 32° 9'47.96"S 23°15'24.78"E Corner 2: 32° 9'26.07"S 23°16'2.34"E Corner 3: 32°10'54.77"S 23°16'17.27"E Corner 4: 32°10'33.73"S 23°16'55.43"E

1.3. Details and Expertise of the Environmental Assessment Practitioner (EAP)

In accordance with Regulation 12 of the 2014 EIA Regulations (GN R326), Brakpan 1 Solar Energy facility (Pty) Ltd. has appointed Savannah Environmental (Pty) Ltd. (Savannah Environmental) as the independent environmental consultant to undertake the Basic Assessment ("BA") and prepare the BA Report for the Brakpan 1 Solar Energy facility and its associated infrastructure. Neither Savannah Environmental nor any of its specialists are subsidiaries of/or are affiliated to Brakpan 1 Solar energy facility (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. Savannah Environmental has developed strong

competencies 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 comprises:

- » **Tamryn Lee Goddard** is the principle author of this report. She holds a bachelor's degree in Environmental Management, and postgraduate higher diplomas in Environmental Engineering, monitoring, and conservation ecology. She has 2 years of experience in the environmental management field. Her key focus is on undertaking environmental impact assessments, GIS mapping, public participation, environmental management plans and programmes. She is registered as a young professional with the International Association of Impact Assessors ("IAIA").

- » **Jo-Anne Thomas** is the Environmental Assessment Practitioner (EAP) for this project. She holds a Master of Science Degree in Botany (M.Sc. 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") and a registered Environmental Assessment Practitioner ("EAP") with the Environmental Assessment Practitioners Association of South Africa ("EAPASA") (2019/726). 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. She 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.

- » **Nondumiso Bulunga** is a Social, GIS and Stakeholder Engagement Specialist at Savannah Environmental. Nondumiso has eight (8) years working experience in project management and facilitation in various industries such as environmental services field including but not limited to recycling, industrial, energy, mining, and agriculture. Working for small and large organisations, Nondumiso has gained exposure in research, collection of data, critical analysis, GIS, and environmental solutions. Nondumiso has worked on projects in South Africa and Malawi. Nondumiso is very well versed in the IFC Environmental and Social Performance Standards (including IFC PS 2012) and the associated Equator Principles, which have informed the approach and standard for projects regarding ESIA. Nondumiso is skilled at organising and driving effective project teams at a scale relevant to the project's requirements. She has technical experience and can quickly identify the most pertinent issues of a particular project whilst focussing on driving project success by rigorously implementing project management tools.

- » **Nicolene Venter.** She is a Board Member of the International Association for Public Participation South Africa ("IAPSA"). 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 ("CV"s) detailing Savannah Environmental team's expertise and relevant experience are provided in **Appendix A**.

CHAPTER 2: PROJECT DESCRIPTION AND ALTERNATIVES

This Chapter describes the Brakpan 1 Solar Energy Facility, comprising a solar PV energy facility and associated infrastructure proposed for development. It must be noted that the project description presented in this Chapter is subject to change to some extent based on the outcomes and recommendations of detailed engineering and other technical studies, the findings and recommendations of the BA and supporting specialist studies, and any licencing, permitting, and legislative requirements.

2.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of 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 .
(g) a motivation for the preferred site, activity, and technology alternative;	Motivation for the preferred development area, activity, and technology alternative is included in sections 2.6 , and 2.8.2 .
(h)(i) details of all the alternatives considered;	The details of all alternatives considered are included in section 2.2 .
(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 2.4 .
(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 2.8 .
(h) (xi) a concluding statement indicating the preferred alternatives, including the preferred location of the activity	A concluding statement indicating the preferred alternatives, including the preferred location of the activity is included in section 2.8.2 .

2.2 Project Site Description

A project site has been identified for the development of Brakpan 1 Solar Energy Facility, i.e. the Farm Poortje No. 76, which is located approximately 15km north-west of Nelspoort and 60km south-west of Beaufort West (refer to Figure 2.1). The total extent of the affected property is ~13 203ha, within which a development area of ~450ha has been considered (refer to Section 2.4 below). The project site can be accessed via existing district gravel roads (i.e. MR587, DR2396, OP9213 OP9212).

2.3 Receptiveness of the Site for development of a PV Project

From a regional perspective, the greater Central Karoo area is considered desirable for the development of commercial solar energy facilities from and a technical perspective 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 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 detail regarding site-specific characteristics and the motivation for the selection of the broader study and development area for the development of Brakpan 1 Solar Energy Facility is provided in the sections which follow.

» **National and Provincial Planning Considerations:** The Integrated Resource Plan (IRP 2010), commits South Africa to generating 42% of its electricity from renewable resources by 2030. The IRP includes the development of an additional 6000 MW of energy from solar PV by 2030. The DFFE undertook a Strategic Environmental Assessment ("SEA") to identify areas best suited to the effective and efficient roll-out of large-scale wind and solar PV energy facilities, in a manner that minimises impacts, and maximises socio-economic benefits to the country. Eleven (11) Renewable Energy Development Zones ("REDZs") were identified through this process. The project site is located within the Beaufort West REDZ ("REDZ 11") and is therefore in line with the planning for renewable energy at a national level.

From a provincial perspective, the Western Cape Climate Change Response Strategy (2014) has set renewable energy as a key area of focus for the Western Cape. The proposed project would contribute to this area of focus and is therefore in line with the provincial planning considerations.

» **Prevailing climatic conditions:** The area surrounding Beaufort West in the Western Cape has been earmarked as a hub for the development of wind and solar energy projects due to the viability of the renewable resources for the area. The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Global Horizontal Irradiation ("GHI") for the study area is approximately 2120kWh/m²/annum. This area of the Western Cape Province is considered to have high solar irradiation values and therefore enables the development of solar energy projects and the successful operation thereof (refer to **Figure 2.2**).

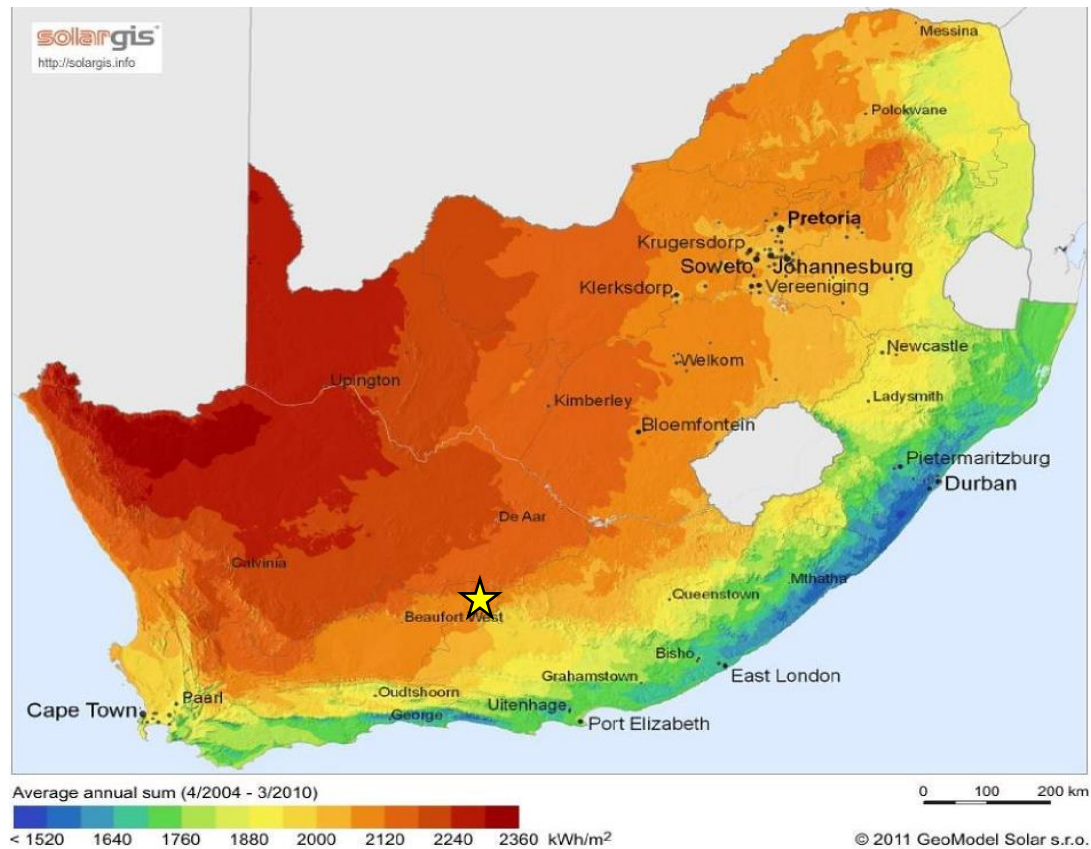


Figure 2.2: Solar irradiation map for South Africa; the proposed Brakpan 1 Solar Energy facility position is shown by the yellow star on the map. (Source: adapted from GeoModel Solar, 2011).

- » **Site extent:** The affected properties (i.e., the Farm Poortje No. 76 and Portion 2 of the Farm Belvedere No.73), known as the project site, are approximately 450 ha in extent, which is sufficient for the installation of a facility with a contracted capacity of up to 190MW and allowing for avoidance of environmental site sensitivities.
- » **Geographic location:** The Project site is located within the Beaufort West REDZ ("REDZ 11") which is a node identified by the Provincial and National Government for the development of renewable energy projects (large scale wind and solar developments). The area is therefore considered suitable for the development of a solar energy facility as proposed.
- » **Topography:** The study area is located on flat high lying land with hills to the north and south where the elevation ranges from 1120 m above sea level (a.s.l) on the site itself to 1520 (a.s.l) for the Bruinrug and Vaalkoppe to the north and south respectively (refer to **Figure 2.3**). Most of the project area is characterised by a slope percentage between 0 and 10%, with some smaller patches within the project area characterised by a slope percentage ranging from 10 to 30%.

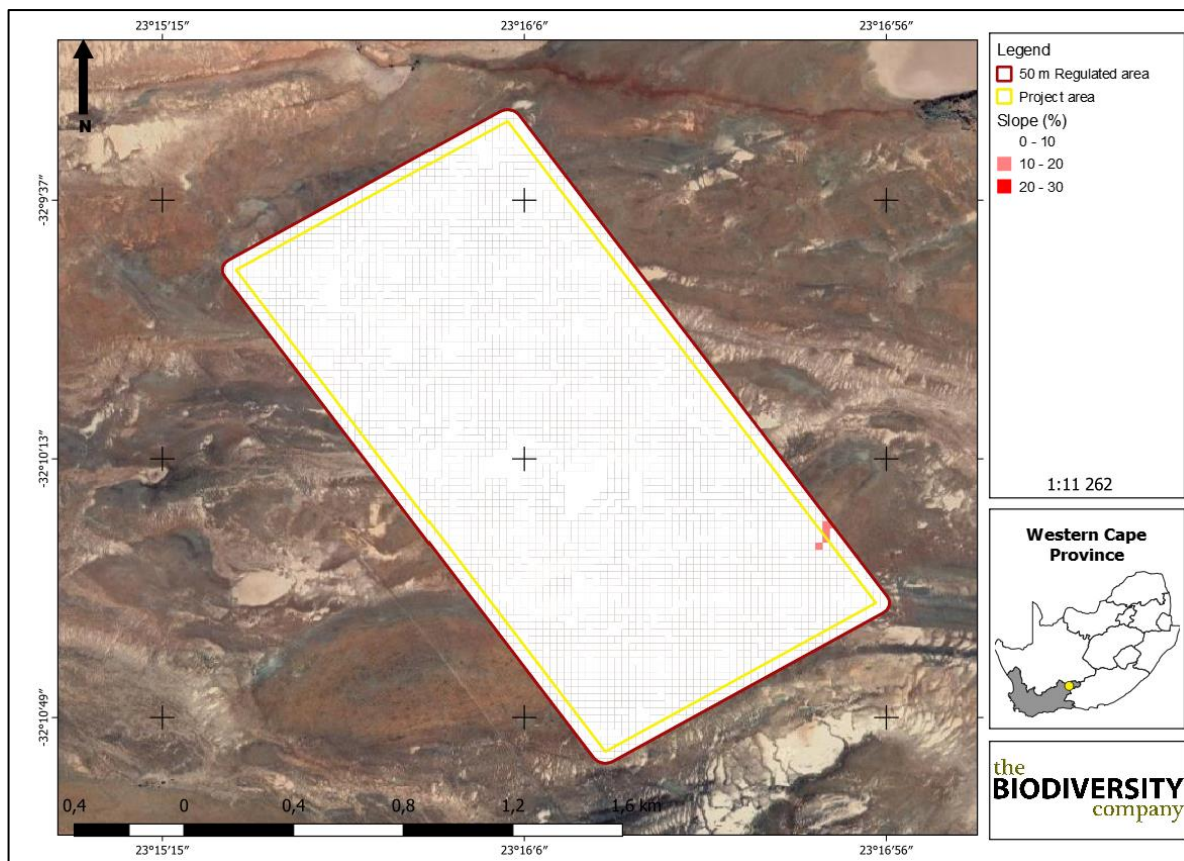


Figure 2.3: Relief Map of the study area (The Biodiversity Company, 2022)

» **Site access:** Access to the project site is considered an important criterion as appropriate access is required for the transportation of project-related infrastructure and heavy machinery during construction. The proximity of the project site to viable access routes decreases the traffic impact on secondary roads during the construction and operation phases of the project. The project site can be accessed via existing Provincial gravel roads. The first section is located on MR587 located between the railway crossing in Nelspoort in the west and the intersection with Divisional Road DR2396 in the east. Vehicles will then turn right onto DR2396 which leads to a poort in the south and continues along minor road OP9213 in a south-westerly direction. Vehicles will then turn right onto Minor Road OP9212 that continues to the site access road. An internal site road network will also be required to provide access to the solar field and associated infrastructure.

Considering the readily available site access to the development area, the location of Brakpan 1 Solar Energy Facility and associated infrastructure is considered suitable and appropriate from a technical perspective.

» **Grid access:** A key factor in the siting of any solar PV project is that the project must have a viable grid connection. All six (6) renewable energy facilities which form part of the Poortjie Wes cluster will connect to the Eskom grid via the following infrastructure:

- * A new 132kV Belvedere Collector Switching Station via 132kV Overhead Lines. The Collector Switching Station will be +/-16ha in extent and will be located on Portion 1 of the Farm Montana No 123.

- * The proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILO MTS via a 132kV OHL (approximately 7km). Depending on which of the OHLs traversing the project site is approved by Eskom, the proposed 132kV OHL will cross the 400kV Droërivier Power Line. A corridor of 300m is being considered in the BA process, within which the 32m servitude for this power line will be located.
- * The MTS will connect to either of the existing 400kV Droërivier/Hydra Overhead Power Lines traversing the property via a Loop-in Loop-out ("LILO") connection. The 2 x 400kV LILO OHLs will be ±1km in length. It is unclear at this stage which of the two OHLs will be approved by Eskom. A corridor of 500m is being considered in a separate BA process, within which the two 55m servitudes for these power lines will be located.

Existing grid infrastructure (i.e., power lines and substations within the study area include, the:

1. 765 kV Gamma/Kappa 1 overhead power line,
2. 400 kV Droërivier/Hydra 2 overhead power line,
3. 400 kV Droërivier/Hydra 1 overhead power line,
4. 400 kV Droërivier/Hydra 3 overhead power line,
5. Riem Traction substation, and a
6. Freight railway line.

The railway line traverses the study area from the west to the north and lies northwest of the proposed Brakpan 1 SEF, while the power lines traverse the study area from the southwest to the north and transect the study area. Grid infrastructure within proximity to the Brakpan 1 Solar Energy Facility provides 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

- » **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 property is the Farm Poortje No. 76, which are privately owned. Both landowners are in favour of the development and do not view the establishment of the solar PV facility as a conflict with the current land-use practices (i.e. grazing). A lease agreement has been entered into with the affected landowners for the proposed project.

Based on the above site-specific attributes, the proponent considers the project site as highly preferred for the development of a solar PV facility from a technical perspective and expects that Brakpan 1 Solar Energy facility will be able to draw on synergies with existing projects within the vicinity of the study area. As a result, no location/property alternatives are proposed as part of this BA process.

2.4 Summary of Development Area Selection Process

As part of the feasibility assessment for the project, an environmental screening of the site was undertaken by the developer to evaluate the main constraints and opportunities and determine whether or not there were any potential fatal flaws or significant no-go areas within the site. The screening process took place prior to the commencement of the BA process and included specialist investigations of the broader project site. This included preliminary field investigations by specialists appointed to undertake the BA studies, as well as desktop consideration of environmental constraints. The purpose of the screening study was to identify areas constrained for development (i.e., no-go areas). The sensitivity spatial data compiled for the larger site was provided to the applicant prior to lodging the application for environmental authorisation.

This is a common approach in the development of renewable energy projects to inform the placement of infrastructure for further investigation in the BA process.

Figure 2.4 provides an overview of the outcome of the Poortjie Wes Cluster environmental screening illustrating the non-developable areas (areas where no infrastructure or development is to occur), precautionary areas, and areas more suitable for development. The non-developable areas were delineated based on the 50 m buffer of the drainage lines which are recommended for maintaining species diversity (Macfarlane et al, 2009) and a 100 m buffer from cliff faces as indicated in (Fynbos Forum, 2016). Brakpan 1 Solar Energy facility (Option A) is considered favourable for the development of a solar energy facility and was recommended for further investigation through a BA process. No feasible alternative development area was identified for the assessment as part of the BA process. The site selection and layout optimisation process applied by the developer (which includes the process followed above) demonstrates due consideration of the suitability of the project site in line with a typical mitigation hierarchy:

1. First Mitigation: avoidance of adverse impacts as far as possible by the use of preventative measures (in this instance an environmental screening and integration process assisted in the avoidance of identified sensitive areas).
2. Second Mitigation: minimisation or reduction of adverse impacts to 'as low as practicable' through the implementation of mitigation and management measures (in this instance the development of technical mitigation solutions as well as recommendations from the various environmental specialists).
3. Third Mitigation: remedy or compensation for adverse residual impacts, which are unavoidable and cannot be reduced further.

As part of the development area selection process and environmental screening, as described above, the first tier of avoidance has already been applied prior to the BA process. No feasible alternative layouts have been identified for investigation. A development area of ~450ha has been identified within the broader project site within which the solar PV facility and associated infrastructure will be sited. As part of the BA process the development area has been fully assessed and the impact of the solar facility ground-truthed by independent specialists. The significance of the impacts associated with the proposed development footprint and the appropriateness of the layout has been assessed and is included in **Chapter 7** and **Appendices D – J** of this report. Where any further conflicts in terms of the development footprint and environmental and social sensitivities or features occur, the mitigation strategy will be further implemented in order to meet the objectives of the mitigation hierarchy (i.e., avoid, minimise, mitigate). A layout for the facility and associated infrastructure has been proposed by the developer considering these environmental sensitivities (refer to **Figure 2.7**).

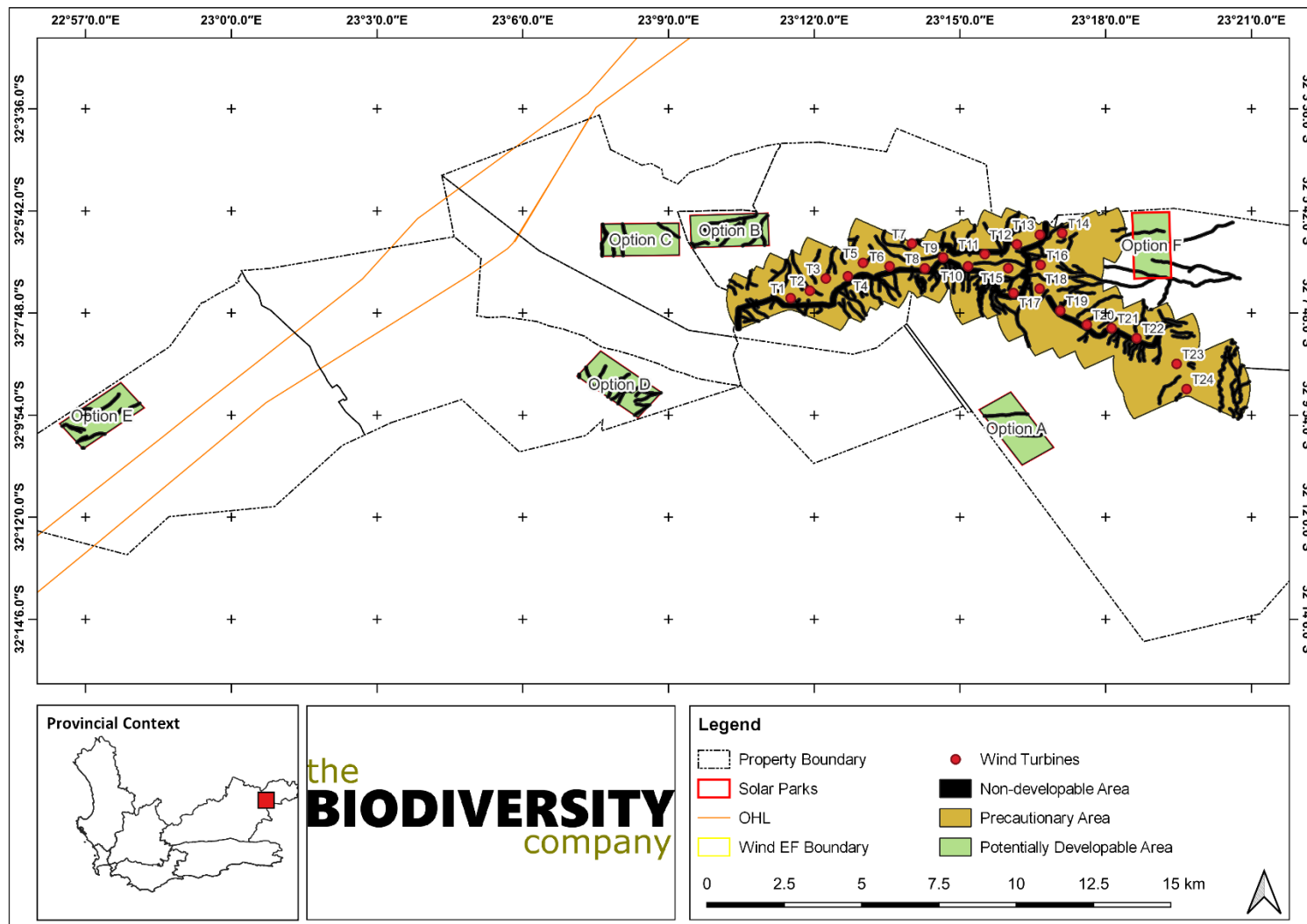


Figure 2.4 Map illustrating the preferred development areas for the proposed Poortjie Wes Renewable Energy Facilities

2.5 Description of the Project Technology

Brakpan 1 Solar Energy facility will have an installed capacity of up to 220MWp and a contracted capacity of up to 190MWac and will make use of PV technology. Solar energy facilities, such as those which utilise PV technology, use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. Generating electricity using the Photovoltaic Effect is achieved through the use of the following components:

PV Cells

A PV cell is made of silicon (Si) that is doped (i.e. another element is introduced to the Si-structure to enhance its electrical properties) to produce the Photovoltaic Effect. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV panel (refer to **Figure 2.5**). Each PV cell is positively charged on one side and negatively charged on the opposite side, with electrical conductors attached to either side to form a circuit. This circuit captures the released electrons in the form of an electric current (i.e. DC).

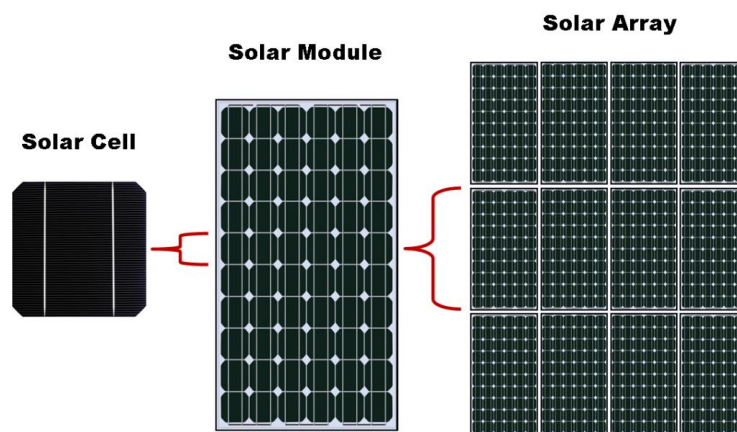


Figure 2.5: Overview of a PV cell, module, and array / panel (Source: pveducation.com).

Inverters

Inverters are used to convert the electricity produced by the PV cells from DC into AC, to enable the facility to be connected to the national electricity grid. To connect a large solar facility such as the one being proposed to the national electricity grid, numerous inverters will be arranged in several arrays to collect and convert power produced by the facility.

Transformers

Transformers are required to transform (i.e. step-up) the power generation by the PV facility from a low voltage to a higher voltage to allow for it to be integrated into the national electricity grid.

Support Structures

PV panels will be fixed to a support structure. PV panels can either utilise fixed / static support structures, or single or double axis tracking support structures (refer to **Figure 2.6**). PV panels that utilise fixed / static support structures are set at an angle (fixed-tilt PV system) 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.

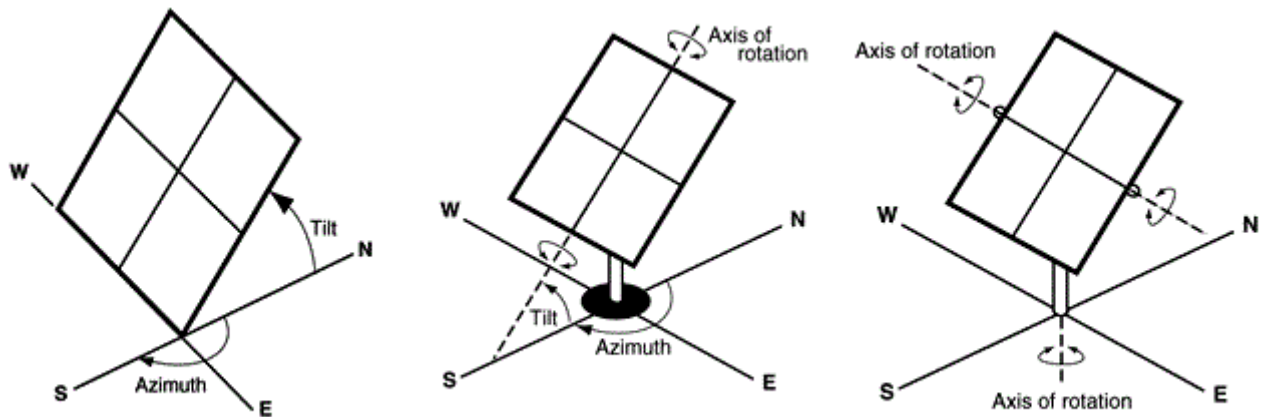


Figure 2.6: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

PV panels are designed to operate continuously for more than 20 years, mostly unattended and with low maintenance.

2.6 Description of the Project Components

The project will comprise the following key infrastructure and components:

(7) Solar Facility

- » PV modules (mono or bifacial);
- » Single-or dualaxis tracking structures, Fixed Axis Tracking, or Fixed Panels;
- » Fixed tilt mounting structure (to be considered during the design phase of the facility);
- » Galvanised steel and/or aluminium solar module mounting structures;
- » Solar module substructure foundations. These will likely be drilled into the ground, filled with concrete, and then have posts fixed inside them. Alternately, ramming may be used; and
- » 60 to 65 Central Inverter stations.

(8) Building Infrastructure

- » Offices;
- » Operational and maintenance control centre;
- » Warehouse/workshop;
- » Panel maintenance and cleaning area;
- » Ablution facilities;
- » A conservancy tank for storage of sewage underground with a capacity of up to 35m³; and
- » Guard Houses.

(9) Associated Infrastructure

- » On-site substation building - IPP owned (including lightning conductor poles);

- » Eskom switching station and a 132kV power line, to be handed over to Eskom at Commercial Operation Date ("COD") (this forms part of a separate BA);
- » Battery storage (500MW/500MWh);
- » Internal distribution lines of up to 33 kV;
- » Underground low voltage cables or cable trays;
- » Internal gravel roads;
- » Fencing;
- » Stormwater channels;
- » Temporary work area during the construction phase; and an
- » Access road to site from the existing District gravel roads off road No. MR 587 (between Nelspoort and Murraysburg), i.e. (i.e. DR2396, OP9213 OP9212).

Table 2.2 provides the details of the Brakpan 1 Solar Energy facility, including the main infrastructure components and services that will be required during the project life cycle.

Table 2.1: Overview of the project and associated infrastructure for Brakpan 1 Solar Energy facility

Total extent of the Development area (including associated infrastructure)	~450ha
Contracted capacity of the facility	190MW AC
Technology	Solar PV using: <ul style="list-style-type: none"> » Static or Tracking Photovoltaic Systems » Bifacial or monofacial
PV panels	<ul style="list-style-type: none"> » Height: ~2.2m from ground level (installed). » 405272 panels required. » Fixed tilt, single-axis or double-axis tracking systems.
Grid connection	On-site inverter (step-up facility) to convert power from Direct Current (DC) to an Alternative (AC) and step up the electric current from 11kV to 132kV that will connect to the on-site substation via underground cables. The electricity will be evacuated via a collector switching station and 132kV power line to the new Poortjie Wes 400/132kV LILLO MTS via a 132kV OHL (approximately 7km). Depending on which of the OHLs traversing the project site is approved by Eskom, the proposed 132kV the OHL will cross the 400kV Droërivier power line.
Site access	The project site can be accessed via existing Provincial gravel roads. The first section is located on MR587 located between the railway crossing in Nelspoort in the west and the intersection with Divisional Road DR2396 in the east. Vehicles will then turn right onto DR2396 which leads to a port in the south and continues along minor road OP9213 in a south-westerly direction. Vehicles will then turn right onto Minor Road OP9212 that continues to the site access road. An internal site road network will also be required to provide access to the solar field and associated infrastructure.
Other infrastructure	<ul style="list-style-type: none"> » Offices; » Operational and maintenance control centre; » Warehouse/workshop; » Panel maintenance and cleaning area; » Ablution facilities; » A conservancy tank for storage of sewage underground with a capacity of up to 35m³; and

	» Guard Houses.
Services required	<ul style="list-style-type: none">» Water – municipal supply or a borehole (the project will either drill a new borehole or arrange with the land owner to register an existing borehole with the Department of Water Affairs).» Refuse material disposal - all refuse material generated from the proposed development will be collected by a contractor and will be disposed of at a licensed waste disposal site off-site. This service will be arranged with the municipality and suitable contractors when required.» Sanitation – all sewage waste will be collected by a contractor and will be disposed of at a licensed waste disposal site during the construction phase. This service will be arranged with the municipality when required during the operational phase.

A layout for the PV facility has been proposed by the proponent for consideration and assessment within this BA Report (refer to **Figure 2.7 and Figure 2.8**).

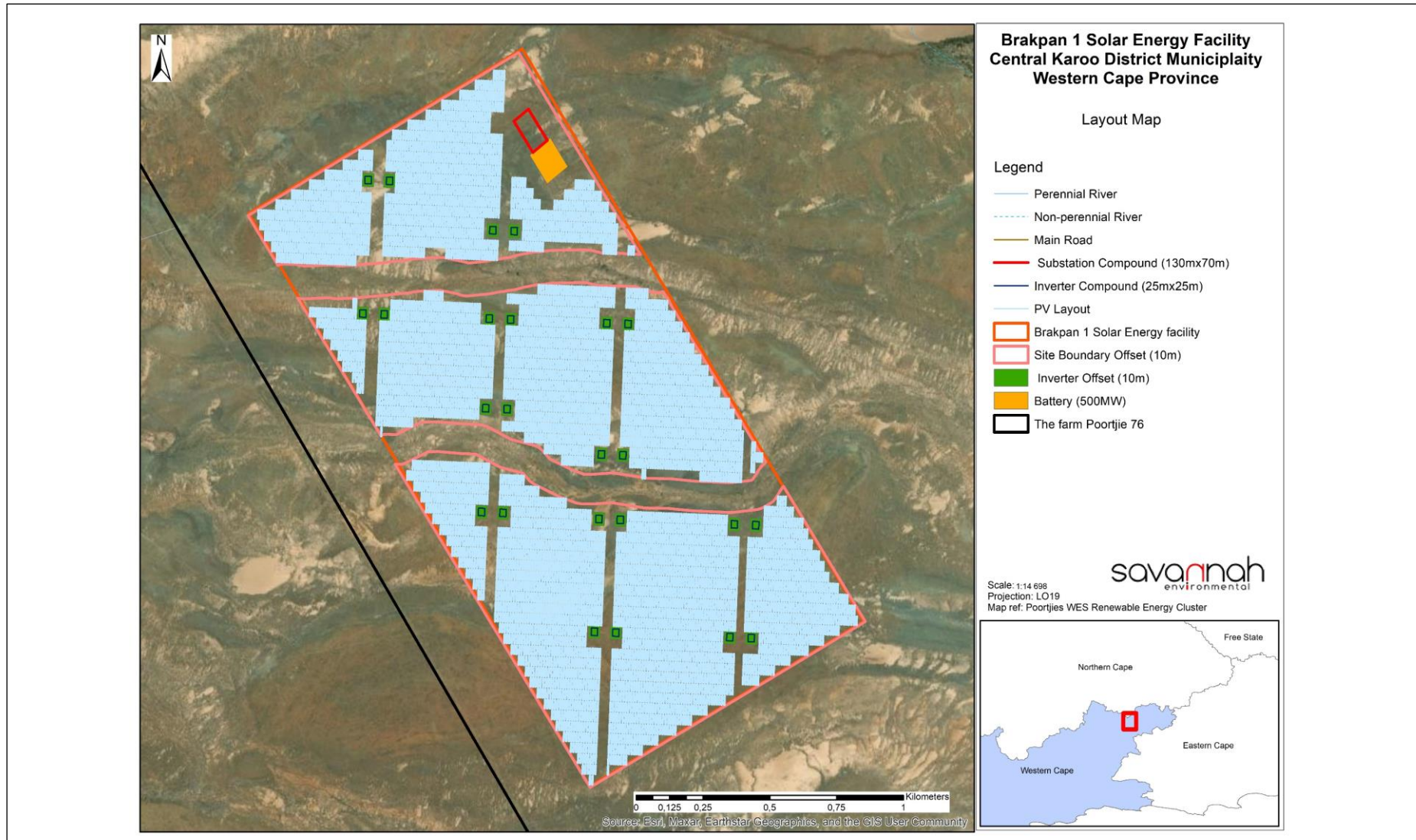


Figure 2.7: Layout map of the proposed Brakpan 1 Solar Energy facility

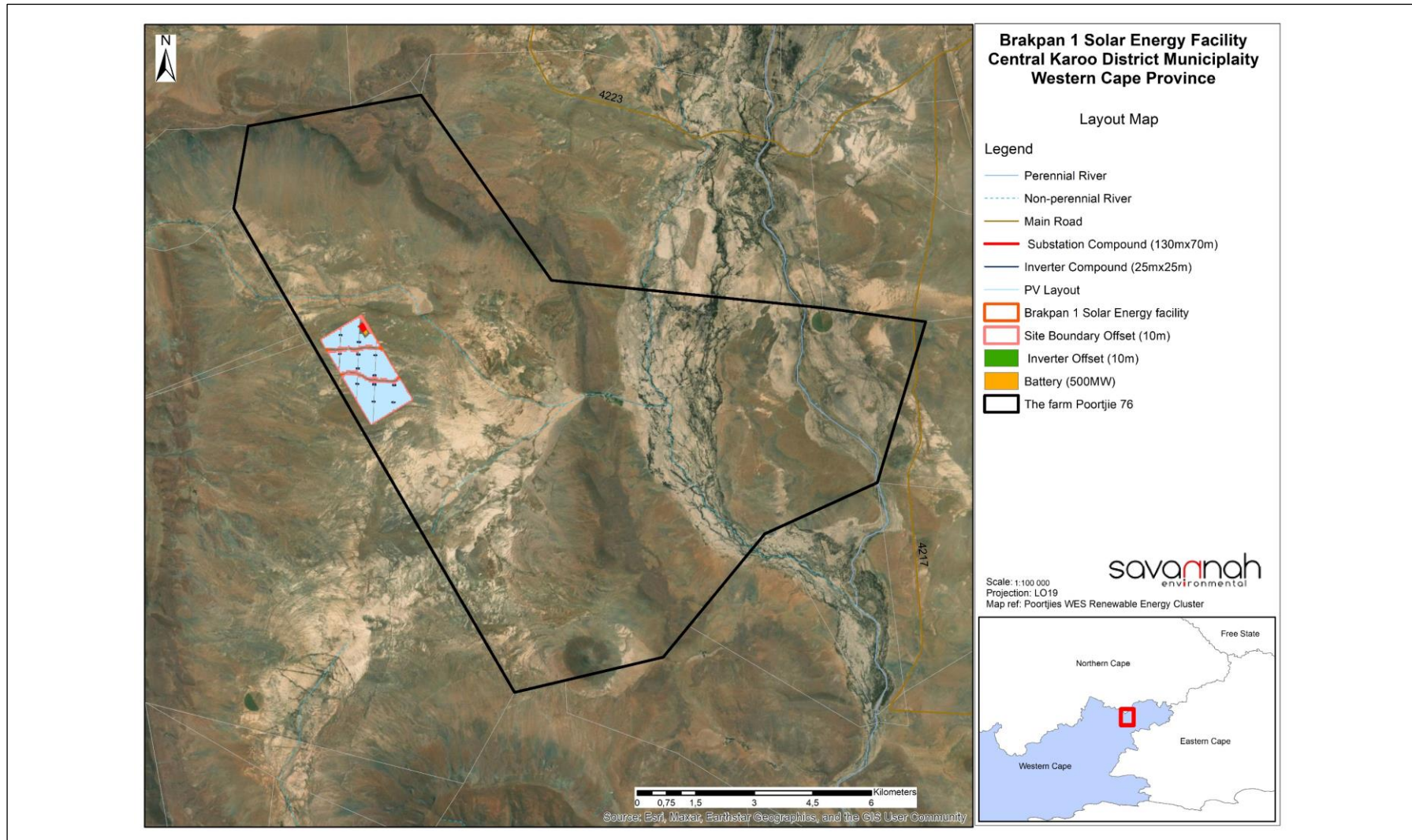


Figure 2.8: Layout map of the proposed Brakpan 1 Solar Energy facility within the farm Poortjie 76

2.7 . Description of Project Alternatives

In accordance with the requirements of Appendix 3 of the 2014 EIA Regulations (GNR 326), an EIA process must contain a consideration of alternatives, which can include site (i.e., development footprint), activity, technology, and site access alternatives, as well as the “do-nothing” alternative. Alternatives are required to be assessed in terms of social, biophysical, economic, and technical factors.

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

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

2.7.1 Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level, and as a result, project-specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity-generating alternatives have been addressed as part of the DMRE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP), 2019¹, and will continue to be addressed as part of future revisions thereto. In this regard, the need for renewable energy power generation (including solar and wind) has been identified as part of the technology mix for power generation in the country in the next 20 years. Of particular relevance to the proposed project is the allocation of 6000MW of new capacity to large-scale PV included in the IRP 2019. The site is considered most suitable for the development of a PV solar energy facility as a result of local irradiation. Therefore, fundamentally different alternatives to the proposed project are not considered within this BA process.

2.7.2 Consideration of Incrementally Different Alternatives

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

- » 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.

¹ The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning.

i) Property or Location Alternatives

As discussed in Sections 2.3 and 2.4 above, the consideration of the suitability of the site for the proposed project is in line with a typical mitigation hierarchy:

1. First Mitigation: avoidance of adverse impacts as far as possible by the use of preventative measures (in this instance a sensitivity analysis assisted in the avoidance of identified ecological, avifaunal, and bat sensitive areas).
2. Second Mitigation: minimisation or reduction of adverse impacts to 'as low as practicable' (in this instance minimisation of impact on identified ecological, avifaunal, and bat sensitive areas through implementing mitigation).
3. Third Mitigation: remedy or compensation for adverse residual impacts, which are unavoidable and cannot be reduced further.

Based on site-specific attributes discussed in Section 2.4, the proponent considers the development area located within the project site as highly preferred in terms of the development of a solar PV facility. As a result, no property/location alternatives are proposed as part of this BA process.

ii) Design and Layout Alternatives

Brakpan 1 Solar Energy facility will have a development footprint of approximately 395ha, to be located within the development area of approximately 450ha. Based on the environmental screening study undertaken for the project, Brakpan 1 Solar Energy facility development area was identified by the developer as being the most technically feasible and viable project area within the broader project site. Specialist field surveys and assessments were undertaken as part of the BA process to provide the proponent with site-specific information regarding the study area and the development area considered for the development (refer to **Appendices D-J**).

As a result, the preferred development area of 450 ha within the affected property (i.e. 13 203ha in extent) is considered the most feasible and appropriate location for Brakpan 1 Solar Energy facility, based on considerations discussed in Section 2.4.

A layout of the facility has been proposed by the developer based on environmental sensitivities identified through this Basic Assessment process (refer to Figure 2.8). No feasible design or layout alternatives were identified for the proposed project.

iii) Technology Alternatives

a) PV Technology Alternatives

The applicant is an IPP proposing only the development of renewable energy technology. Considering the available natural energy resources within the area, as detailed in the previous sections, and the current significant restrictions placed on other natural resources such as water, it is considered that PV is the preferred option for the development of a solar facility within the preferred project site. In addition, grid connection infrastructure to connect the solar facility to the national grid is present in the surrounding area which enables an easy and short connection.

Considering the suitability of the project site for the development of a solar facility, the current land-use activities being undertaken within the project site which relates to grazing and compatibility thereof with the proposed development, the size of the development footprint for the solar facility (i.e. ~395ha) and the minimal loss to grazing carrying capacity as a result of the development due to the low agricultural potential of the site, the activity (i.e. the development of a solar PV facility) is considered to be appropriate.

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. The Integrated Resource Plan (IRP) 2019, excludes the procurement of power from CSP facilities until 2030, whereas a new additional capacity of approximately 6 000MW will be required from solar PV facilities. Therefore, PV technology was identified as being the preferred option for the study area. Solar PV consists of a lower visual profile and limited water requirements when compared to the CSP technology option.

Considering the above, no other power generation technology alternatives are being assessed for development on the proposed site.

When considering PV as a technology choice, several types of panels are available, including *inter alia*:

Static or Tracking Photovoltaic Systems Solar trackers rotate solar panels during the day in such a way that solar panel follows the direction of the sun to obtain maximum energy from the sun. In the fixed-tilt solar plant, the solar PV panels are permanently affixed on the roof of the building or the ground using steel frameworks. For achieving maximum efficiency from solar panels, they must be installed in the direction that receives most of the sunlight. For the northern hemisphere, the solar PV panel must face southward whereas it faces northward in the southern hemisphere to absorb much of the sunlight.

- » **Monofacial panels:** monofacial panels only have one side of solar cells collecting light. They do not require reflective surfaces and special mounting equipment.
- » **Bifacial panels:** Bifacial (“two-faced”) modules produce solar power from both sides of the panel. Traditional solar panels capture sunlight on one light-absorbing side. The light energy that cannot be captured is simply reflected away. Bifacial solar panels have solar cells on both sides, which enables the panels to absorb light from the back and the front. Practically speaking, this means that a bifacial solar panel can absorb light reflected off the ground or another material. In general, more power can be generated from bifacial modules for the same area, without having to increase the development footprint. The optimum tilt for a bifacial module has to be designed to capture a big fraction of the reflected irradiation. The use of trackers is recommended so the modules can track the sun’s movement across the sky, enabling them to stay directed to receive the maximum possible sunlight to generate power.

The primary difference between PV technologies available relates to the extent of the facility, as well as the height of the facility (visual impacts), while the potential for environmental impacts remains similar in magnitude. Fixed mounted PV systems can 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 acceptable for implementation from an environmental perspective.

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. Once environmental constraining factors have been determined through the BA process, the applicant will consider various solar panel options i.e. mono-facial or bi-facial. The preferred option will be informed by efficiency, local content requirements at the time of bid into the REIPP Procurement Programme, as well as environmental impact and constraints (such as sensitive biophysical features).

b) Battery Energy Storage System Alternatives

The general purpose and utilisation of a Battery Energy Storage System (“BESS”) is to save and store excess electrical output as it is generated, allowing for a timed release when the capacity is required. BESS systems, therefore, provide flexibility in the efficient operation of the electric grid through decoupling of the energy supply and demand. **Figures 2.9, 2.10, 2.11, and 2.12** illustrate a typical utility-scale BESS system (a Lithium-Ion BESS) as applied in the context of a Renewable Energy Facility.



Figure 2.9: Li-Ion BESS implementation for a Renewable Energy facility (Source: Enel Green Power).



Figure 2.10: Li-Ion BESS containerised modules located within the BESS enclosure footprint (Source: Enel Green Power).



Figure 2.11: Li-Ion BESS internal design and implementation of a container used within a BESS. The image shows a series of sealed battery cell packs within a containerised module (Source: Enel Green Power).



Figure 2.12: Illustration of battery storage units installed by Tesla (Source: fastcompany.com).

As technological advances within battery energy storage systems ("BESS") are frequent, no specific technology can be determined for use by the proponent at this stage. Two BESS technology alternatives are available:

- » Solid-state battery electrolytes typically consist of Lead Acid (Pb), Nickel Cadmium (NiCad), Lithium-Ion (Li-Ion), and Sodium Sulphur ("NaS"), or Sodium Nickel Chloride (Zebra) (NaNiCl) and use solid electrodes and electrolytes. As a result of the declining costs, Li-ion technology now accounts for more than 90% of battery storage additions globally (IRENA, 2019); and
- » Redox-flow technology (e.g. vanadium flow battery, or similar technology and chemistries). Flow batteries use solid electrodes and liquid electrolytes. The most used flow battery is the Vanadium Redox Flow Battery (VRFB), which is a type of rechargeable flow battery that employs vanadium ions in different oxidative states to store chemical potential energy.

However, only solid-state technology types are envisaged for the proposed project. The technology includes batteries housed within containers that are fully enclosed and self-contained. It is important to note, that no specific solid-state technology is proposed as the preferred for authorisation, as all are expected to have similar impacts due to their design and functions being closely related. Therefore, the assessment proposes all solid-state technologies for authorisation to allow the proponent to determine the precise technology when the project is implemented, on the understanding that further investigation into the specific technologies available at the time of being awarded preferred bidder status will allow for one of two to be selected and ultimately developed.

The BESS will be compliant with all local laws and regulations and health and safety requirements governing battery facilities. Over and above that they will comply with international standards such as UN 38.3 (Transportation Testing for Lithium Batteries), UL 1642 (Standard for Safety – Lithium-ion Batteries), and IEC 62619 (Secondary cells and batteries containing alkaline or other non-acid electrolytes Safety requirements

for secondary lithium cells and batteries, for use in industrial applications). Furthermore, the battery facility will also comply with standards such as UL 1973 (Batteries for Use in Stationary Applications) and IEC 62619-2017 including thermal runaway non-propagation and safety zone region operation limits, and a failure mode analysis. The design will be compliant with UL 9540 (Energy Storage Systems and Equipment): this standard defines the safety requirements for battery installation in industrial and grid-connected applications.

The design of the BESS in compliance with all the local and international standards ensures that fire risk is minimal. Furthermore, each container has a built-in fire detection and suppression system. This system continually monitors the batteries and in an unlikely event of a fire, it suppresses the fire using inert gas. Each container is also spaced about 3m apart ensuring the chance of a fire spreading between containers (which are made of metal and therefore not easily flammable) is also minimal. **Figure 2.13** below provides a typical configuration of a fire detection and suppression system.



Figure 2.13: Typical configuration of fire detection and suppression system


iv) The ‘Do-Nothing’ Alternative

The ‘Do-Nothing’ alternative is the option of not constructing the Brakpan 1 Solar Energy facility. 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 7** and **Chapter 8** of this BA Report).

2.8 . Activities during the Project Development Stages

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

<u>Pre-construction</u>	
Requirements	» Planning and Design of facility
Activities to be undertaken	
Site preparation	<ul style="list-style-type: none"> » Confirming the integrity of site access to accommodate the required equipment. » Preparation of the site (e.g., laydown areas). » Mobilisation of construction equipment.
Conduct surveys prior to construction	» Including, but not limited to a detailed site survey and confirmation of the infrastructure micro-siting footprint, a survey of the on-site substation site, and O&M building area to determine and confirm the locations of all associated infrastructure.
<u>Construction Phase</u>	
Requirements	<ul style="list-style-type: none"> » Project requires Environmental Authorisation from DFFE, selection as a Preferred Bidder, and a generation license issued by NERSA. » Duration of construction expected to be up to 18 to 24 months for the Brakpan 1 Solar Energy facility. » Create direct construction employment opportunities: Up to 150 jobs (at peak of construction) created and maintained for approximately two and a half years. » Security staff will also be present during the night-time of the construction phase. » Waste removal and sanitation will be undertaken by a sub-contractor or the municipality, where possible. Waste containers, including containers for hazardous waste, will be located at easily accessible locations on site when construction activities are undertaken. » Electricity required for construction activities will be generated by a generator or will be sourced from available 11kV or 22kV Eskom distribution networks in the area. Should the electricity be sourced from the Eskom distribution network be the most feasible option, the Project Company will apply to Eskom for a supply » Water will be required for the construction phase, which will be approximately 5 000m³ per year. Water will be sourced from either boreholes (drilled onsite or an existing borehole) or from the Municipality (if sourced from the Municipality).
Activities to be undertaken	
Establishment of access roads to the Site	<ul style="list-style-type: none"> » Access/haul roads and internal access roads within the site will be established at the commencement of construction. » Existing access roads will be utilised where possible to minimise impact and upgraded where required. » Access roads to the site will have a width of up to 6m. » Access roads to be established between the project components for construction and/or maintenance activities within the development footprint. » Internal service road alignment will be approximately 4m wide.
Undertake site preparation	<ul style="list-style-type: none"> » Including the clearance of vegetation at the footprint of each support structure, the establishment of the laydown areas, the establishment of internal access roads, and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled, removed from the site, and/or spread on site. » To be undertaken systematically to reduce the risk of exposed ground being subjected to erosion. » Include search and rescue of floral Species of Conservation Concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required).
Establishment of laydown	» A laydown area for the storage of project components, including the PV panels and civil engineering construction equipment.

<p>areas and batching plant on site</p>	<ul style="list-style-type: none"> » The laydown area will also accommodate building materials and equipment associated with the construction of buildings. » Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas, which have been authorised independently to the Brakpan 1 BA process.
<p>Transport of components and equipment to and within the site</p>	<ul style="list-style-type: none"> » Transportation will take place via appropriate National and Provincial roads, and the dedicated access/haul road to the site. » 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) 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.
<p>Erect PV Panels and Construct Substation, Inverters</p>	<ul style="list-style-type: none"> » Installation of the solar PV panels and the structural and electrical infrastructure to make the plant operational. » For array installation, typically vertical support posts/piles are driven into the ground. Depending on the results of the geotechnical investigation a different foundation method may be required. Different options include a screw pile, helical pile, micro-pile, or drilled post/pile which may or may not need to be cast in concrete underground at an appropriate depth as determined by the Geotechnical investigation. The posts will hold the support structures (tables) on which PV arrays would be mounted. Brackets attach the PV modules to the tables. <div style="display: flex; justify-content: space-around; align-items: center;">  </div> <ul style="list-style-type: none"> » Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared. » Wire harnesses connect the PV modules to the electrical collection systems.
<p>Construction of the substation and BESS</p>	<ul style="list-style-type: none"> » One on-site substation to be constructed within the development footprint. » Substation will be constructed with a high-voltage yard footprint. » The BESS will be constructed as part onsite substation and will require a survey of the footprint, site clearing and levelling. For solid-state batteries, the battery cell packs (containing an electrolyte solution) will be brought to the site as sealed units which will be installed and connected on site.
<p>Establishment of ancillary infrastructure</p>	<ul style="list-style-type: none"> » Operation and Maintenance buildings including a gatehouse, security building, control centre, offices, warehouses, a workshop, and visitor's centre. » Temporary staff accommodation is required for the duration of construction. » Establishment will require the clearing of vegetation, levelling, and the excavation of foundations prior to construction.
<p>Connection of PV facility to the onsite substation</p>	<ul style="list-style-type: none"> » Underground cables and overhead circuits connect the string inverters to the on-site AC electrical infrastructure (central inverter) and ultimately the project's on-site substation. » Excavation of trenches are required for the installation of the cables. Trenches will be approximately 1.2m deep. » Underground cables are planned to follow the internal access roads, as far as possible.

Connect the substation to the power grid	<p>All six (6) renewable energy ("RE") facilities that form part of the Poortjie Wes cluster will connect to the Eskom grid via the following infrastructure:</p> <ul style="list-style-type: none"> » A 132kV Belvedere Collector Switching Station (the "Collector Switching Station") via 132kV Overhead Lines ("OHLs"). The Collector Switching Station will be +/-16ha in extent and will be located on Portion 1 of the Farm Belvedere Nr. 73, in the Beaufort West Municipality, Division of Murraysburg, Western Cape Province. » The proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILO MTS ("Poortjie Wes LILO MTS") via a 132kV OHL (approximately 7km). Depending on which of the OHLs traversing the project site is approved by Eskom, the proposed 132kV the OHL will cross the 400kV Droërivier/Hydra OHL. A corridor of 300m is being considered in the BA process, within which the 32m servitude for this power line will be located. » The MTS will connect to either of the existing 400kV Droërivier/Hydra OHL) traversing the property via a Loop-in Loop-out ("LILO") connection. The 2 x 400kV LILO OHLs will be +/- 1km in length. It is unclear at this stage which of the two OHLs will be approved by Eskom. A corridor of 500m is being considered in the BA process, within which the two 55m servitudes for these power lines will be located.
Undertake site rehabilitation	<ul style="list-style-type: none"> » Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. » On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.
<u>Operation Phase</u>	
Requirements	<ul style="list-style-type: none"> » Duration will be 20-25 years, or longer depending on the need for the project. » Requirements for security and maintenance of the facility. » Employment opportunities relating mainly to operational activities and maintenance. Up to 20 full-time and 10 temporary direct employment opportunities will be available. » Water will be required for the operation phase. Approximately 5000m³ of water per annum will be required for the cleaning of the PV modules. Water will be sourced from existing boreholes in the area or municipal supply. » Current land-use activities being undertaken within the project site can continue during the operation of the PV facility.
Activities to be undertaken	
Operation and Maintenance	<ul style="list-style-type: none"> » Full time security, maintenance, and control room staff. » PV facility will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » PV facility to be subject to periodic maintenance and inspection. » Disposal of waste products (e.g., oil) in accordance with relevant waste management legislation. » Areas that were disturbed during the construction phase to be utilised should a laydown area be required during operation. » PV panels will be washed during operation utilising clean water or non-hazardous biodegradable cleaning products. Wastewater generated by washing can be allowed to run-off under the panels.
<u>Decommissioning Phase</u>	
Requirements	<ul style="list-style-type: none"> » Decommissioning of the Brakpan 1 facility infrastructure at the end of its economic life. » Potential for repowering of the facility, depending on the condition of the facility at the time. » Expected lifespan of approximately 20 - 25 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	<ul style="list-style-type: none"> » Confirming the integrity of site access to accommodate the required equipment. » Preparation of the site (e.g., laydown areas and construction platform).

	» Mobilisation of equipment required for decommissioning.
Disconnect, Disassemble and remove solar facility components	<ul style="list-style-type: none"> » Disconnect the facility from the grid. » Dismantle all panels, mounting structures, and foundations in line with all relevant legislation. » Recycle, repurpose and re-use as much of the decommissioned project components as possible in accordance with regulatory requirements. » Concrete foundations will be removed to a depth as defined by an agricultural specialist. » Backfill the mounting structure holes and rehabilitate the area appropriately. » Visible cables will be removed. » Access roads will either be left for use by landowners/future landowners or covered with topsoil or reduced in width. » A final site walkthrough will be conducted to remove debris and/or waste generated within the site during the decommissioning process. » Rehabilitation may include top soiling, raking, and/or re-seeding (whichever is appropriate).

It is expected that the areas of the project site affected by the solar facility infrastructure (development footprint) will revert to their original land use (i.e., primarily grazing) once the Brakpan 1 Solar Energy facility has reached the end of its economic life and all infrastructure has been decommissioned.

CHAPTER 3: 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 Brakpan 1 Solar Energy Facility and the associated infrastructure is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that apply to this activity and are to be considered in the assessment process which may apply to or have bearing on the proposed project. It also provides information that supports the need and justification for the project, which is further discussed in Chapter 4.

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

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

Requirement	Relevant Section
(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 Brakpan 1 Solar Energy Facility is proposed is included in sections 3.3, 3.4, and 3.5.
(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.	

3.2. Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by ongoing strategic planning undertaken by the Department of Mineral Resources and Energy. The hierarchy of policy and planning documentation that supports the development of renewable energy projects, such as solar energy facilities, is illustrated in **Figure 3.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies and plans that have relevance to the development of the Brakpan 1 Solar Energy Facility.

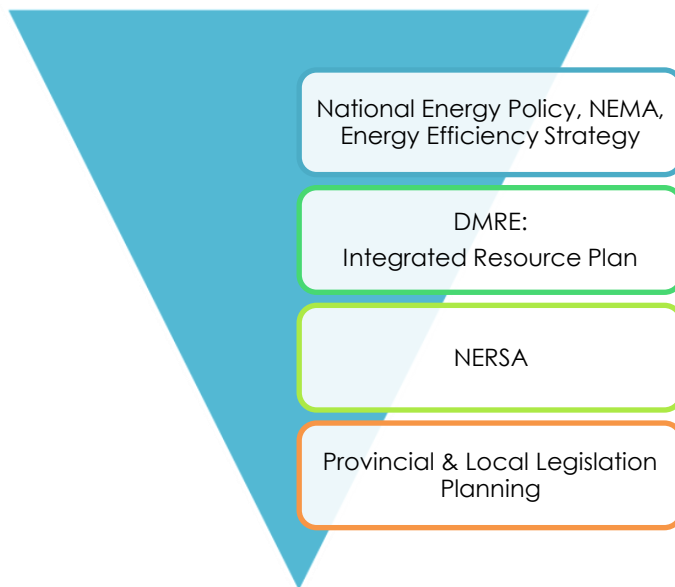


Figure 3.1: Hierarchy of electricity and planning documents

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 multi-sectoral (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process of a solar energy project and the related statutory environmental assessment process.

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

- » **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity and, since merging with the Department of Mineral Resources (DMR), is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (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 resources 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 Forestry, Fisheries, and the Environment (DFFE):** 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. DEFF is the competent authority for this project (as per GNR 779 of 01 July 2016) and is charged with granting the EA for the project under consideration. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).
- » **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- » **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.

- » **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation).
- » **The Department of Agriculture, Rural Development and Land Reform (DARDLD):** This Department is the custodian of South Africa's agricultural resources and is responsible for the formulation and implementation of policies governing the agriculture sector and the initiation, facilitation, coordination, and implementation of integrated rural development programmes.

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

- » **Western Cape Department of Environmental Affairs and Development Planning (DEA&DP):** This Department is the commenting authority for the EIA process for the project.
- » **The Western Cape Nature Conservation Board trading as CapeNature:** This Department is the commenting authority for the BA process for the project and is responsible for issuing other biodiversity and conservation-related permits.
- » **Western Cape Department of Transport and Public Works:** This Department provides effective coordination of crime prevention initiatives, provincial police oversight, traffic management, and road safety towards a more secure environment.
- » **Heritage Western Cape:** This Department identifies, conserves, and manages heritage resources throughout the Western 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 Western Cape Province, both the local and district municipalities play a role. The local municipality includes the **Beaufort West Local Municipality** which forms part of the **Central Karoo District Municipality**. In terms of the Municipal Systems Act (No. 32 of 2000), all municipalities must go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

3.3 International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of the Brakpan 1 Solar Energy Facility is provided below in **Table 3.1**. Brakpan 1 Solar Energy Facility is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 3.1: International policies relevant to Brakpan 1 Solar Energy Facility

Relevant policy	Relevance to the proposed project
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	<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</p>

Relevant policy	Relevance to the proposed project
	<p>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>The Paris Agreement set out that every 5 years countries must set out increasingly ambitious climate action. This meant that, by 2020, countries needed to submit or update their plans for reducing emissions, known as nationally determined contributions (NDCs). The COP26 summit held in 2021 brought parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. On 13 November 2021, COP26 concluded in Glasgow with all countries agreeing on the Glasgow Climate Pact to keep 1.5°C alive and finalise the outstanding elements of the Paris Agreement.</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 Brakpan 1 Solar Energy Facility which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assisting in sustainably reducing GHG emissions.</p>
<p>The Equator Principles 4 (October 2020)</p>	<p>The Equator Principles (EPs) 4 constitute a financial industry benchmark used for determining, assessing, and managing a 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 apply to large infrastructure projects (such as Brakpan 1 Solar Energy Facility) 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 the Brakpan 1 Solar Energy Facility. 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>

Relevant policy	Relevance to the proposed project
	<p>Brakpan 1 Solar Energy Facility 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 are 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 2013.</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 8 establishes 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, 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 the Brakpan 1 Solar Energy Facility, it is anticipated (at this stage of the process) that Performance Standards 1, 2, 3, 4, 6, and 8 may apply to the project.</p>

3.4 National Policy

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. The development of the Brakpan 1 Solar PV Facility is considered to align with the aims of these policies, even where contributions to achieving the goals therein are only minor.

3.4.1 The National Energy Act (No. 34 of 2008)

The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while considering environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The National Energy Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and carriers, adequate investment in, appropriate upkeep, and access to energy infrastructure. The Act provides measures for the furnishing of certain data and information regarding energy demand, supply, and generation, and for

establishing an institution to be responsible for the promotion of efficient generation and consumption of energy and energy research.

The Act provides the legal framework which supports the development of power generation facilities, such as the Brakpan 1 Solar Energy Facility.

3.4.2 White Paper on the Energy Policy of South Africa, 1998

The South African Energy Policy, published by the then Department of Minerals and Energy (DME) in December 1998 identifies five key objectives, namely:

- » Increasing access to affordable energy services.
- » Improving energy sector governance.
- » Stimulating economic development.
- » Managing energy-related environmental impacts.
- » Securing supply through diversity.

To meet these objectives and the developmental and socio-economic objectives of South Africa, the country needs to optimally use available energy resources. The South African Government is required to address what can be done to meet these electricity needs both in the short and long term. The White Paper identifies key objectives for energy supply, such as increasing access to affordable energy services, managing energy-related environmental impacts, and securing energy supply through diversifying South Africa's electricity mix.

This policy recognises that renewable energy applications have specific characteristics which need to be considered. The Energy Policy is *“based on the understanding that renewables are energy sources in their own right, and are not limited to small-scale and remote applications, and have significant medium- and long-term commercial potential.”* In addition, the National Energy Policy states that *“Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future”*.

The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e., the cost of fuel in generating electricity from such technology), more so when social and environmental costs are considered. Despite this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications have been neglected in South Africa.

Government policy on renewable energy is therefore concerned with addressing the following challenges:

- » Ensuring that economically feasible technologies and applications are implemented.
- » Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential, and compared to investments in other energy supply options.
- » Addressing constraints on the development of the renewable industry.

3.4.3 White Paper on the Renewable Energy Policy, 2003

The White Paper on Renewable Energy Policy supplements the Government's overarching policy on energy as set out in its White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The White Paper on Renewable Energy Policy recognises the significance of the medium and long-term potential of renewable energy. The main aim of the policy is to create the conditions for the development and commercial implementation of renewable technologies. The position of the White Paper on Renewable Energy is based on the integrated resource planning criterion of:

"Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options."

The White Paper on Renewable Energy sets out the Government's vision, policy principles, strategic goals, and objectives for promoting and implementing renewable energy in South Africa. It also informs the public and the international community of the Government's vision, and how the Government intends to achieve these objectives and informs Government agencies and organs of their roles in achieving the objectives.

South Africa relies heavily on coal to meet its energy needs because it is well-endowed with coal resources in particular. However, South Africa is endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, but which have so far remained largely untapped. This White Paper fosters the uptake of renewable energy in the economy and has several objectives that include:

- » Ensuring that equitable resources are invested in renewable technologies.
- » Directing public resources for the implementation of renewable energy technologies.
- » Introducing suitable fiscal incentives for renewable energy.
- » Creating an investment climate for the development of the renewable energy sector.

The objectives of the White Paper are considered in six focal areas, namely:

- i) Financial instruments.
- ii) Legal instruments.
- iii) Technology development.
- iv) Awareness raising.
- v) Capacity building and education.
- vi) Market-based instruments and regulatory instruments.

The policy supports the investment in renewable energy facilities as they contribute to ensuring energy security through the diversification of energy supply, reducing Greenhouse Gas (GHG) emissions, and promoting renewable energy sources.

3.4.4 The Electricity Regulation Act (No. 04 of 2006) (ERA)

The Electricity Regulation Act (No. 04 of 2006) as amended by the Electricity Regulation Act (No. 28 of 2007), replaced the Electricity Act (No. 41 of 1987), as amended, except Section 5B, which provides funds for the energy regulator to regulate the electricity industry.

The ERA establishes a national regulatory framework for the electricity supply industry and made NERSA custodian and enforcer of the National Electricity Regulatory Framework. The ERA also provides for licences and registration as to how the generation, transmission, distribution, reticulation, trading, and import and

export of electricity is regulated. Projects developed by IPPs which exceed 100MW in capacity are required to obtain a Generation License from the National Energy Regulator of South Africa (NERSA).

3.4.5 The National Development Plan (NDP) 2030

The National Development Plan (NDP) 2030 offers a long-term plan for the country. It defines desired destinations where inequality and unemployment are reduced, and poverty is eliminated so that all South Africans can attain a decent standard of living. Electricity is one of the core elements of a decent standard of living.

While the achievement of the objectives of the NDP requires progress on a broad front, three priorities stand out, namely:

- » Raising employment through faster economic growth
- » Improving the quality of education, skills development, and innovation
- » Building the capability of the state to play a developmental, transformative role

In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:

- » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates while supporting economic growth through job creation.
- » Social equity through expanded access to energy at affordable tariffs and targeted sustainable subsidies for needy households.
- » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.

In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system looks very different from the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role.

3.4.6 Integrated Energy Plan (IEP), November 2016

The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework that has multiple aims, some of which include:

- » To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.
- » To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels).
- » To guide investment in and the development of energy infrastructure in South Africa.

- » To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, the introduction of new technologies, and effects of exogenous macro-economic factors.

A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to consider changes in the macroeconomic environment, developments in new technologies, and changes in national priorities and imperatives, amongst others.

The 8 key objectives of the integrated energy planning process are as follows:

- » Objective 1: Ensure security of supply.
- » Objective 2: Minimise the cost of energy.
- » Objective 3: Promote the creation of jobs and localisation.
- » Objective 4: Minimise negative environmental impacts from the energy sector.
- » Objective 5: Promote the conservation of water.
- » Objective 6: Diversify supply sources and primary sources of energy.
- » Objective 7: Promote energy efficiency in the economy.
- » Objective 8: Increase access to modern energy.

3.4.7 Integrated Resource Plan (IRP) for Electricity 2010 - 2030

The Integrated Resource Plan (IRP) for Electricity is a subset of the IEP and constitutes South Africa's National electricity plan. The IRP is an electricity infrastructure development plan based on the least-cost electricity supply and demand balance, considering the security of supply and the environment. 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.

The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation, and regional development.

Since the promulgated IRP 2010–2030, the following capacity developments have taken place:

- » A total of 6 422 MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3 876 MW operational and made available to the grid as of 31 March 2021² with 5 078MW from 79 IPP projects operational and made available to the grid³.
- » 2 000MW of generating capacity (comprising various technologies) has been awarded to 8 Independent Power Producers under the RMIPPPP in March 2021.

² Bid windows 1, 2, 3, 3.5, 4 and small BW1(1S2) and small BW2(2S2). 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021.

³<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>

- » 2 583MW of electricity in bid window 5 of the REIPPPP, announced on 28 October 2021 (DMRE, 2021).
- » IPPs have commissioned 1 005 MW from two Open Cycle Gas Turbine (OCGT) peaking plants.
- » Under the Eskom build programme, the following capacity has been commissioned:
 - * 1 332 MW of Ingula pumped storage, 1 588 MW of Medupi, 800 MW of Kusile and
 - * 100 MW of Sere Wind Farm.
- » 18 000MW of new generation capacity has been committed.

Besides capacity additions, a number of assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. In addition, environmental considerations such as South Africa's contribution to Greenhouse gases which contribute to climate change, local air quality, and water availability have come to the fore.

These considerations necessitated the review and update of the IRP and ultimately the promulgation of a revised plan in October 2019. In terms of the IRP 2019, South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. South Africa is a signatory to the Paris Agreement on Climate Change and has ratified the agreement. In line with INDCs (submitted to the UNFCCC in November 2016), South Africa's emissions are expected to peak, plateau and from the year 2025 decline.

Following consideration of all these factors, the following Plan was promulgated.

	Coal	Coal (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1 860	2,100	2 912	1 474	1 980	300	3 830	499
2019	2,155	-2,373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1,433	-557				114	300			
2021	1,433	-1,403				300	818			
2022	711	-844			513	400	1,000	1,600		
2023	750	-555				1000	1,600		500	
2024			1,860				1,600	1000	500	
2025						1000	1,600		500	
2026		-1,219					1,600		500	
2027	750	-847					1,600	2000	500	
2028		-475				1000	1,600		500	
2029		-1,694			1575	1000	1,600		500	
2030		-1,050		2,500		1000	1,600		500	
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

<ul style="list-style-type: none"> Installed Capacity Committed/Already Contracted Capacity Capacity Decommissioned New Additional Capacity Extension of Koeberg Plant Design Life Includes Distributed Generation Capacity for own use 	<ul style="list-style-type: none"> • 2030 Coal Installed Capacity is less capacity decommissioned between years 2020 and 2030. • Koeberg power station rated/installed capacity will revert to 1,926MW (original design capacity) following design life extension work. • Other/ Distributed generation includes all generation facilities in circumstances in which the facility is operated solely to supply electricity to an end-use customer within the same property with the facility. • Short term capacity gap is estimated at 2,000MW.
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Figure 3.2: IRP 2019 as promulgated in October 2019

This plan provides for the development of 6000MW of new capacity from large-scale PV. Brakpan 1 Solar Energy Facility project would contribute towards this goal.

3.4.8 New Growth Path (NGP) Framework, 23 November 2010

The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020. With economic growth and employment creation as the key indicators identified in the NGP. The framework seeks to identify key structural changes in the economy that can improve performance in terms of labour absorption and the composition and rate of growth.

To achieve this, the government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and develop a policy package to facilitate employment creation in these areas.

3.4.9 National Climate Change Bill, 2018

On 08 June 2018, the Minister of Environmental Affairs published the National Climate Change Bill ("the Bill") for public comment. The purpose of the Bill is to build an effective climate change response and ensure the long-term, just transition to a climate-resilient and lower carbon economy and society. This will be done within the context of sustainable development for South Africa and will provide for all matters related to climate change.

The National Climate Change Bill addresses issues related to institutional and coordination arrangements across the three spheres of government namely national, provincial, and local. It further highlights the need for the spheres of government and entities, sectors as well businesses to respond to the challenges of climate change. The bill further addresses the matters relating to, the national adaptation to impacts of climate change, greenhouse gas emissions and removals, and policy alignment and institutional arrangements. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The following objectives are set within the Bill:

- a) Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance;
- b) Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change, to build social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response;
- c) Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social, and environmental development to proceed sustainably.

Brakpan 1 Solar Energy Facility comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

3.4.10 National Climate Change Response Policy, 2011

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.

As an integral part of the policy, a set of near-term priority flagship programmes will be implemented to address the challenges of climate change, one of which includes the Renewable Energy Flagship Programme. This flagship programme includes a scaled-up renewable energy programme, based on the current programme specified in the IRP 2010, and uses the evolving South African Renewables Initiative led by the Department of Public Enterprise and Department of Trade and Industry (DTI), as a driver for the deployment of renewable energy technologies. The programme will be informed by enhanced domestic manufacturing potential and the implementation of energy efficiency and renewable energy plans by the local government.

The development of the Brakpan 1 Solar Energy Facility is aligned with the Renewable Energy Flagship Programme identified under South Africa's NCCRP and could therefore be argued to be aligned with the country's approach to addressing climate change.

3.4.11 Climate Change Bill, 2018

On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate-resilient, low carbon economy, and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans.

Brakpan 1 Solar Energy Facility comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

3.4.12 Strategic Integrated Projects (SIPs)

The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, and strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through the greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development, and enabling regional integration. SIP 8 and 9 of the energy SIPs support the development of the solar energy facility:

- » SIP 8: 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 – 2030) and supports biofuel production facilities.
- » SIP 9: Electricity generation to support socio-economic development: The proposed Brakpan 1 Solar Energy Facility is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development, and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department of Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances.

Brakpan 1 Solar Energy Facility could be registered as a SIP project once it is under development. The project would then contribute to the above-mentioned SIPs.

3.4.13 Renewable Energy Development Zones

The Strategic Environmental Assessment (“SEA”) for Wind and Solar Photovoltaic Energy in South Africa, 2015, has identified 11 Renewable Energy Development Zones (“REDZs”) that are of strategic importance for large-scale wind and solar photovoltaic energy development, in terms of Strategic Integrated Project (SIP) 8: Green Energy in support of the South African Economy. The site is located within REDZ 11 (Beaufort West). **Figure 3.3** below illustrates the location of the Brakpan 1 Solar Energy Facility within the REDZ 11.

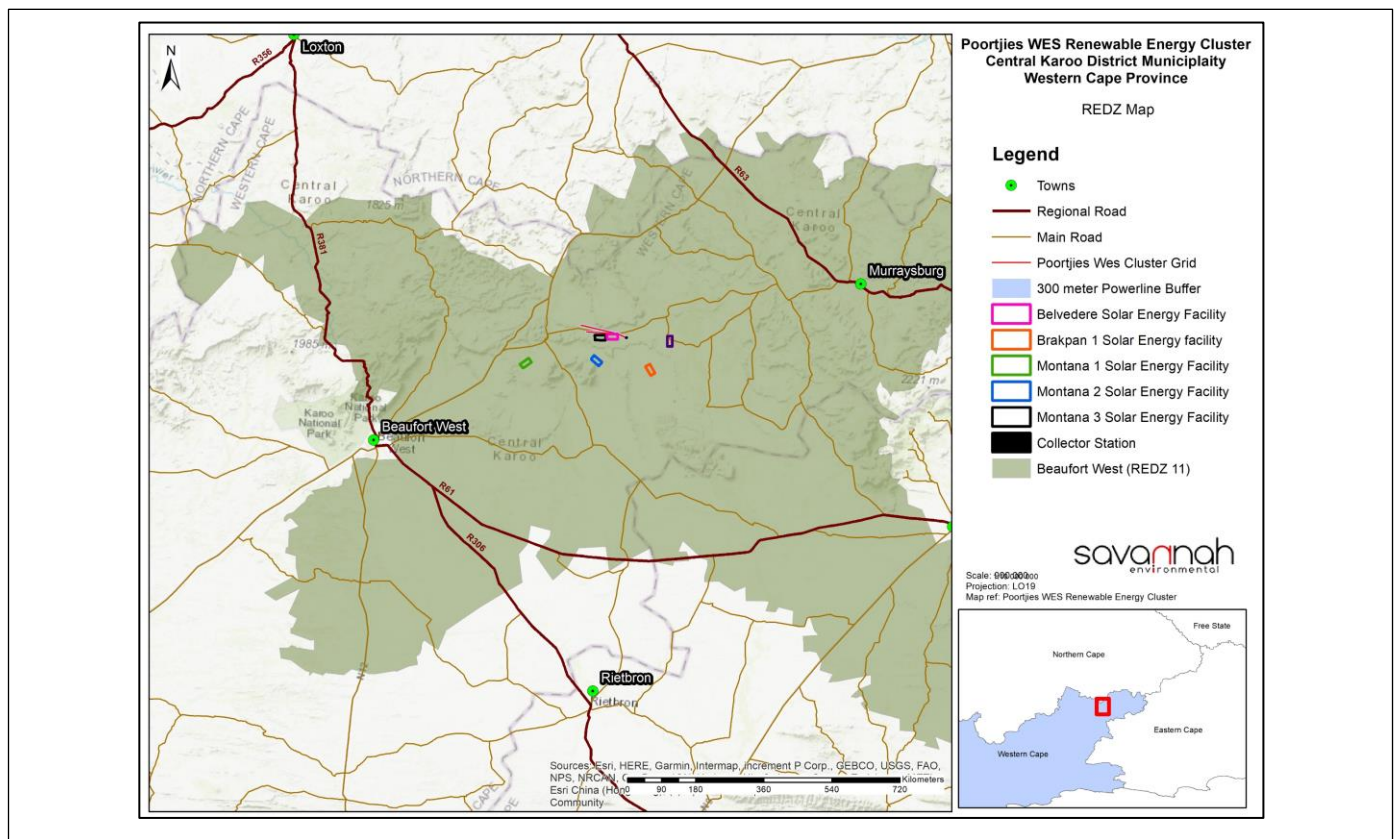


Figure 3.3: Brakpan 1 Solar Energy Facility is located within the REDZ 11

3.4.14 National Biodiversity Economy Strategy (“NBES”) (March 2016)

The biodiversity economy of South Africa encompasses the businesses and economic activities that either directly depend on biodiversity for their core business or that contribute to the conservation of biodiversity through their activities. The commercial wildlife and the bioprospecting industries of South Africa provide cornerstones for the biodiversity economy and are the focus of this strategy.

Both the wildlife and bioprospecting sub-sectors of the biodiversity economy have already demonstrated the potential for significant future development and growth. In the study commissioned on the situational analysis of the biodiversity economy, the contribution of the biodiversity economy to the national economy can be measured in terms of Gross Domestic Product (GDP), with the wildlife and bioprospecting industries contributing approximately R3 billion to GDP in 2013. Growth in the wildlife and bioprospecting industries can make a significant impact on the national economy while contributing to national imperatives such as job creation, rural development, and conservation of our natural resources.

The Wildlife Industry value chain is centred on game and wildlife farming/ranching activities that relate to the stocking, trading, breeding, and hunting of game, and all the services and goods required to support this value chain. The key drivers of this value chain include domestic hunters, international hunters, and growing retail market demand for wildlife products such as game meat and taxidermy products. This sector is therefore characterized by an interesting combination of agriculture, eco-tourism and conservation characteristics.

Over the period 2008-2013, the total Wildlife Industry market grew by more than 14% per year. This growth comprised an average annual growth exceeding 6% in domestic hunting, a decrease in international hunting, and an exponential growth in live auction sales. It is considered likely that the consolidated Wildlife Industry has the potential to experience a weighted average annual growth rate of between 4 % and -14 % per year up to 2030.

For the wildlife and bioprospecting sub-sectors of the biodiversity economy to achieve its full potential, a strategic partnership between the state, private sector, and communities is required. To this end, a National Biodiversity Economy Strategy (NBES) is required to guide the sustainable growth of the wildlife and bioprospecting industries and to provide a basis for addressing constraints to growth, ensuring sustainability, identifying clear stakeholder's responsibilities, and monitoring the progress of the Enabling Actions.

The Vision of NBES is to optimise the total economic benefits of the wildlife and bioprospecting industries through its sustainable use, in line with the Vision of the Department of Environmental Affairs. The purpose of NBES is to provide 14-year national coordination, leadership, and guidance to the development and growth of the biodiversity economy.

NBES has set an industry growth goal stating that by 2030, the South African biodiversity economy will achieve an average annualised GDP growth rate of 10% per annum. This envisioned growth curve extends into the year 2030 and is aligned with the efforts of the country's National Development Plan, Vision 2030. The NBES seeks to contribute to the transformation of the biodiversity economy in South Africa through inclusive economic opportunities, reflected by an equitable sector - equitable access to resources, equitable and fair processes and procedures, and equitable in the distribution of resources (i.e. business, human, financial, indigenous species, land, water) in the market.

To address these transformation NBES imperatives, NBES embraces the following principles]:

- » Conservation of biodiversity and ecological infrastructure
- » Sustainable use of indigenous resources
- » Fair and equitable beneficiation
- » Socio-economic sustainability
- » Incentive driven compliance with regulation
- » Ethical practices
- » Improving quality and standards of products.

The NBES provides the opportunity to redistribute South Africa's indigenous biological/ genetic resources equitably, across various income categories and settlement areas of the country. The NBES has prioritised nodes in the country for biodiversity economy transformation, referred to as BET nodes. NBES prioritises 18 BET nodes, 13 rural and 5 urban districts across the nine provinces of the country, with communities having been prioritised for the development of small and medium-sized enterprises and community-based initiatives which sustainably use of indigenous biological and/or genetic resources. The municipality within which the project is proposed is not included as one of these nodes.

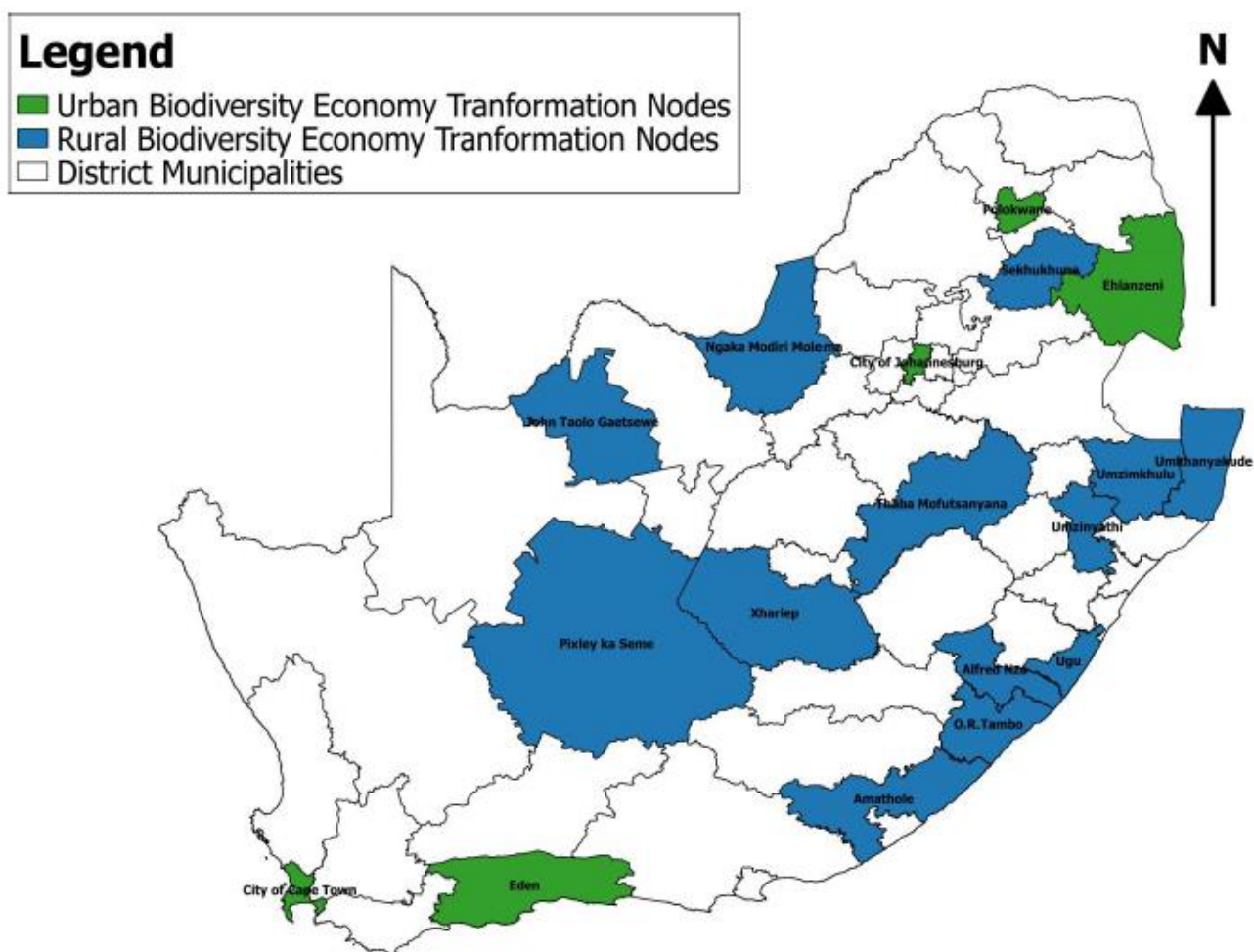


Figure 3.4: Map of the Biodiversity Economy Transformation (“BET”) nodes which are the transformation priorities of the NBES

3.5 Provincial Planning and Context

3.5.1 Western Cape Provincial Spatial Development Framework ("PSDF") 2014

The Western Cape Government ("WCG") and the City of Cape Town ("CCT") mandated the Economic Development Partnership (EDP) to "scope a long-term economic vision and plan involving all key Western Cape economic leaders as well as citizens for the next 30 to 40 years." This Provincial initiative, referred to as OneCape 2040, complements the National Development Plan and builds on the WCG's Provincial Strategic Objectives (PSOs) which sets the goal of achieving sustainability through sustainable, low-carbon resource use.

The Western Cape Draft Strategic Plan (2009 – 2014) outlines the 12 Provincial Strategic Objectives (PSOs) of the Western Cape Government. Structures have been established for the PSOs to ensure a system of transversal working across the province. Climate change has been identified as a priority focus area and PSO7 (Mainstreaming Sustainability and Optimising Resource-Use Efficiency) comprises a number of working groups that relate to climate change:

- » Energy Work Group – to ensure sustainable energy systems and move towards a low carbon economy in the Western Cape;
- » Climate Change Adaptation Work Group – to reduce vulnerability and increase coping capacity to climate risk within the communities, economy, and ecosystems of the Western Cape;
- » The Sustainable Resource Management Work Group – to implement programmes and projects towards managing our natural resources sustainably, without compromising ecosystem integrity
- » The Land-Use Planning Work Group – to ensure coordinated and integrated land use planning throughout the province.

In addition, the Green Economy Work Group, which sits under PSO1 (Increasing Opportunities for Growth and Jobs), is focused on promoting the Green Economy in the Western Cape, of which climate change-related objectives and projects are significant focus. PSO11 (Creating Opportunities for Growth and Development in Rural Areas) deals with the development of the rural economy with clear links to climate change through the agriculture sector activities.

3.5.2 Green is Smart- The Western Cape Climate Change Response Strategy

Green is Smart sets out an agenda for how the Western Cape can become a global pioneer in the green economy and the leading green economic hub of the African continent. It is a framework for shifting the Western Cape economy from its current carbon intensive and resource wasteful path with high levels of poverty to one that is smarter, greener, more competitive and more equal and inclusive.

Five drivers for the transition are identified (smart mobility, smart living & working, smart ecosystems, smart agri-processing, smart enterprise), along with five enablers (finance, rules & regulations, knowledge management, capabilities, infrastructure) that are needed to create the environment for the proposed new economic growth path. The strategic framework presents stakeholders with an opportunity to create a region with a sustainable future and the potential for consistent economic growth. There are also opportunities to use this growth to address the Western Cape's social exclusion and unemployment challenges. Such an economy is set to attract investment and retain people looking to visit, invest, work, live and study in the Western Cape. Importantly, the framework identifies priorities that would position the Western Cape as a pioneer and early adopter of green economic activity.

Climate Change is a key driver of the green economy and the priority activities in the Green Economy Strategy Framework support the implementation of the Climate Change Response Strategy and vice versa. The alignment between the two documents is important in addressing climate change responses and promoting the green economy.

The key concepts related to the space economy policies of the PSDF are illustrated in Figure 3.5. In summary, these are to prioritise the roll-out of the 'greener' economy and promote rural economic diversification using off-grid infrastructure technologies and support land reform and integrated rural development.

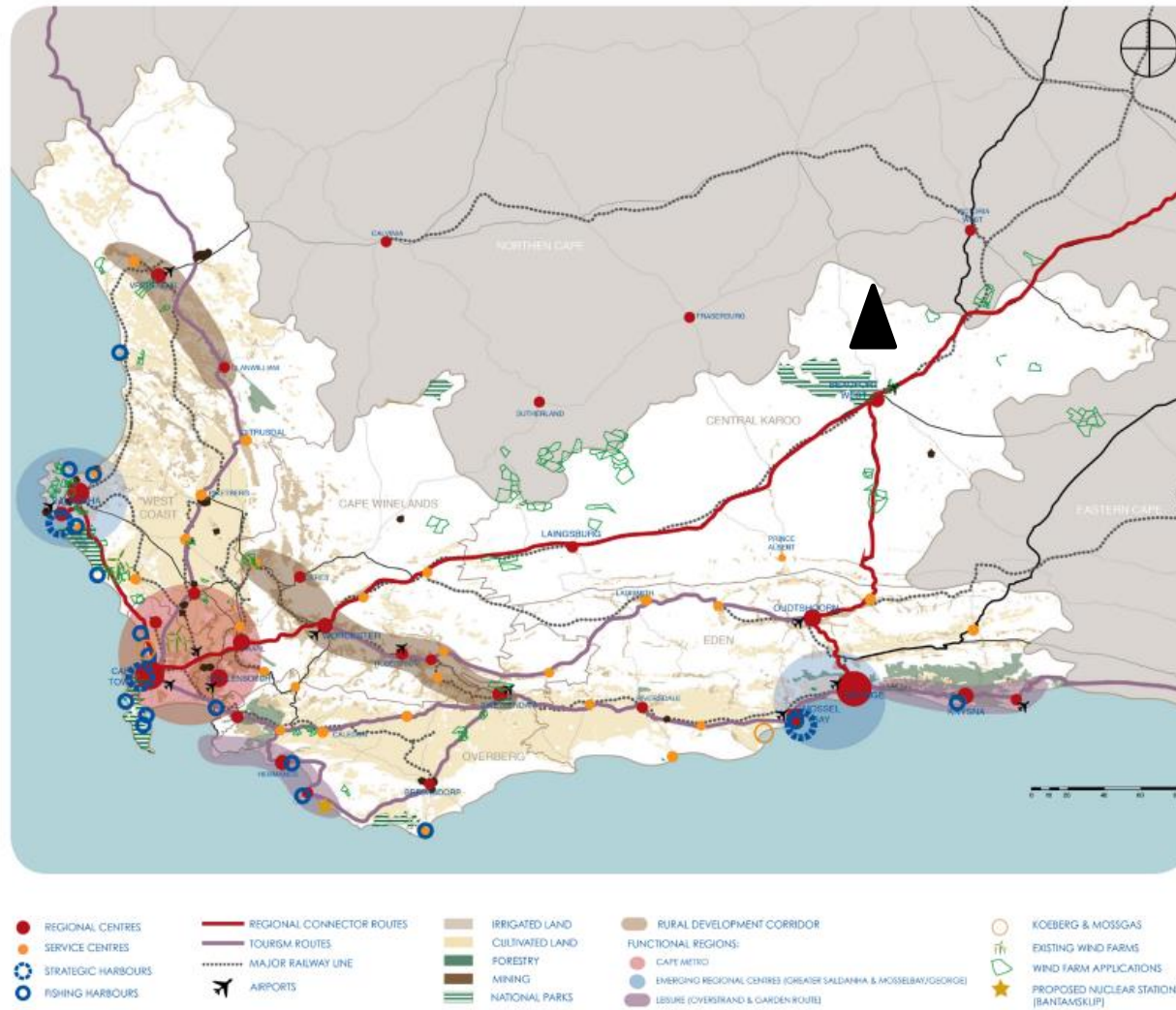


FIG.38 WESTERN CAPE PROVINCE - SPACE-ECONOMY SYNTHESISED AND CONSOLIDATED FRAMEWORK

Figure 3.5: Development regions and corridors of the Western Cape (Source: Western Cape PSDF 2014). The position of the Brakpan 1 Solar Energy Facility site is indicated by the black triangle

Although the proposed project site is not located in any specific area identified for development, the development of Brakpan 1 Solar Energy Facility will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Western Cape.

3.6 Local Policy and Planning Context

The local tiers of government within which Brakpan 1 Solar Energy Facility is located in the Beaufort West Local Municipality within the Great Karoo District Municipality. The development instruments or policies at both the district and local levels contain objectives that are in line with the development of the Brakpan 1 Solar Energy Facility. These include economic growth, job creation, community upliftment, and poverty alleviation.

Table 3.1: Relevant district and local legislation and policies for Brakpan 1 Solar Energy Facility

Relevant policy	Relevance to Brakpan 1 Solar Energy facility
<p>Central Karoo District Municipality Integrated Development Plan (IDP), (2017-2022)</p>	<p>The 2017 – 2022 Central Karoo Integrated Development Plan has the following vision for the Central Karoo: Working together in Development and Growth. It is proposed that the spatial vision also includes the need for resilience, and therefore the spatial vision is proposed to be: “Working together in Sustainable Spatial Development and Growth towards a Resilient Central Karoo”</p> <p>In support of realising the above vision, the SDF unpacks it by focusing on the following three spatial strategies and one underpinning governance strategy, which also informs the spatial concept:</p> <ul style="list-style-type: none"> » Strategy A: A region that protects the environment, enhances resilience, and capitalises on and honour’s the Karoo charm in support of a vibrant people and economy. » Strategy B: Improve regional and rural accessibility and mobility for people and goods in support of a resilient economy. » Strategy C: Allocate government resources, infrastructure, and facilities in a manner that uplifts and skills people and focuses on maximising impact on the most possible people, while providing a basic level of service for all. » Strategy D: Partnership-driven governance and administration towards improved financial and non-financial sustainability and resilience. <p>The purpose of chapter 4 of the CKIDP is to provide the overarching spatial vision for the Central Karoo, determine the future growth needs, frame the spatial concept, and then set out the spatial policies for the Central Karoo. Strategy A of Chapter 4 sets out the initiative for the Central Karoo to be a region that protects the environment, enhances resilience, and capitalises on and honours the Karoo charm in support of a vibrant people and growing the economy. The following policies will be supported through the proposed development</p> <ul style="list-style-type: none"> » Policy A1: protect critical biodiversity areas, environmental support areas & natural environment towards a resilient central karoo; » Policy A5: support and promote the renewable energy economy; and » Policy A8: central karoo climate change adaptation and mitigation policy. <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.</p>

Relevant policy	Relevance to Brakpan 1 Solar Energy facility
	<p>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>Beaufort West Local Municipality Draft Integrated Development Plan for 2022/2027</p>	<p>The following sector plans should be drafted or reviewed before the tabling and adoption of the 2022-2027 five-year IDP. The development priorities, recommendations, and critical challenges identified in sector plans must be incorporated into the five-year IDP. Issues relating to energy and electricity have been identified and include the need to develop a renewable energy plan for the LM.</p> <p>The LM confirms that it is involved in the national programme for the development of renewable energy facilities in response to global climate change mitigation. Furthermore, several renewable energy projects are proposed in the Greater Karoo District Municipality, and it is considered that the sector must be exploited to ensure the creation of new job opportunities for local people.</p>
<p>Beaufort West Spatial Development Framework (2015)</p>	<p>The Beaufort West Municipality Spatial Development Framework (SDF) was found to be most relevant with respect to specific planning guidance near Beaufort West town. It was completed in 2015 and builds on the 2013 Urban Restructuring Framework. Climate change will be incorporated in the responses of the Municipality's planning and service delivery so that climate change can be effectively addressed. Climate change must be integrated into existing policies and plans in response to climate change. Supporting sector plans and in particularly the SDF, must all include climate change considerations for all sectors to ensure that trade-offs and synergies are understood and met with available science and robust analysis.</p>

CHAPTER 4: PROJECT NEED AND DESIRABILITY

Appendix 1 of the EIA Regulations, 2014 (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 the Brakpan 1 Solar Energy facility 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.

4.1. Need and Desirability from an International Perspective

The need and desirability of the Brakpan 1 Solar Energy Facility, from an international perspective, can be described through the project's alignment with internationally recognised and adopted agreements, protocols, and conventions. South Africa is signatory to a number of international treaties and initiatives, including the United Nations Development Programme's ("UNDP"'s) Sustainable Development Goals ("SDGs"). The SDGs address social and economic development issues such as poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanization, environment, and social justice. The SDGs comprise 17 global goals set by the United Nations. The 17 SDGs are characterised by 169 targets and 304 indicators.

Goal 7 of the SGDs 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 facilitate access to clean energy research and technology, including renewable energy, energy efficiency, and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.	7.A.1	Mobilized number of United States dollars per year starting in 2020 accountable towards the \$100 billion commitment.
7.B	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing	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.

Targets	Indicators
countries, in accordance with their respective programmes of support.	

The development of the Brakpan 1 Solar Energy facility would contribute positively towards Goal 7 of the SGDs through the following means:

- » By generating up to 220MW 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 IPP announcements", Dr. Tobias Bischof-Niemz and Ruan Fourie) which took into consideration the results of the cost prices bid successfully under the DMRE's REIPPP and Coal Baseload IPP ("CBIPP") Procurement Programmes found that solar Photovoltaic ("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.

4.2. Need and Desirability from a National Perspective

4.2.1. Policy and Planning

Brakpan 1 Solar Energy facility is proposed in specific response to the requirement for diversification of the country's energy mix to include renewable energy such as solar PV as detailed in the IRP 2019. As a result, the need and desirability of the Brakpan 1 Solar Energy facility from a national perspective, can largely be assimilated from the project's alignment with national government policies, plans, and programmes that have relevance to energy planning and production (as discussed in detail in **Chapter 3**). The following key plans have been developed by government to consider South Africa's current energy production, projected future demands, and provide the necessary framework within which energy generation projects can be developed:

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

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 megajoules per square meter [MJ/m²]) (Stassen, 1996), compared to about 3.6kWh/m² in parts of the United States and about 2.5kWh/m² in Europe and the United Kingdom. The total area of high radiation in South Africa amounts to approximately 194 000km², including the Western Cape. With electricity production per square kilometre of mirror surface in a solar thermal power station being 30.2MW, and just 1% of the high radiation area in the country being made available for solar power generation, the generation potential is approximately 64GW. 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 that 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 Western 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 included 9.6GW of nuclear, 6.25GW of coal, **17.8GW of renewables** (which includes 6000MW of solar PV), and approximately 8.9GW of other generation sources such as hydro and gas in addition to all existing and committed power plants.

Since the promulgated IRP 2010, the following capacity developments have taken place:

- » A total of **6 422MW** under the Renewable Energy Independent Power Producer (“REIPP”) Procurement Programme has been procured⁴ with **5 078MW** being operational and made available to the grid;
- » **1 005MW** has been commissioned by IPPs from the two (2) Open Cycle Gas Turbine (“OCGT”) peaking plants; and
- » Under the Eskom Build Programme, **1 332MW** has been commissioned from the Ingula Pump Storage Project in Kwa-Zulu Natal, **4 764MW** and **4 800MW** from the Medupi and Kusile power stations, and **100MW** has been commissioned from the Sere Wind Farm.

Besides capacity additions, a number of assumptions changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom’s existing plant performance, as well as new technology costs. In addition, environmental considerations such as South Africa’s contribution to Greenhouse gases which contribute to climate change, local air quality, and water availability have come to the fore.

These considerations necessitated the review and update of the IRP and ultimately the promulgation of a revised plan in October 2019. In terms of the IRP 2019, South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. South Africa is a signatory to the Paris Agreement on Climate Change and has ratified the agreement. In line with NDCs (submitted to the UNFCCC in November 2016), South Africa’s emissions are expected to peak, plateau and from year 2025 decline. As detailed in Chapter 2 of this report, the IRP 2019 provides for the development of 6000MW of new capacity from large scale PV.

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

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

The government has compiled an Economic Reconstruction and Recovery Plan which was presented to Parliament in October 2020. According to this plan, the economic survey will rely on a massive investment in infrastructure, including energy, telecommunications, ports, and rail. The core elements of the Economic Reconstruction and Recovery Plan are as follows:

1. Priority interventions for economic recovery: the plan sets out eight priority interventions that will ignite South Africa’s recovery and reconstruction effort. These are the flagship initiatives that all of society will rally around to build a new economy (Figure 4.1).

⁴ Bid windows 1, 2, 3, 3.5, 4 and small BW1(1S2) and small BW2(2S2). 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021

2. Enabling conditions for growth: these are growth-enhancing reforms and other preconditions for an inclusive, competitive and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery require careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution, and is supported by enhanced institutional arrangements to ensure implementation and accountability.

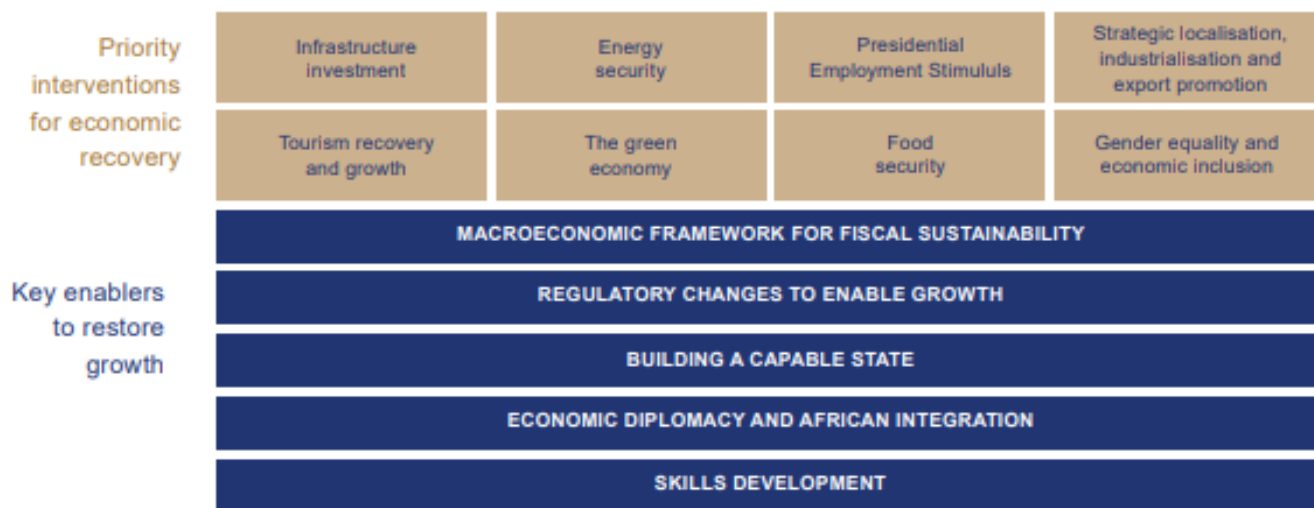


Figure 4.1: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

The plan recognises energy security as the most important prerequisite for the recovery agenda and states that renewed investment in a diversified energy mix can be achieved within a short time horizon while alleviating a crippling energy crisis and facilitating a necessary transition to a less carbon-intensive economy. One of the key commitments of the plan is therefore to implement the IRP 2019 without delay to provide a substantial increase in the contribution of renewable energy sources by 2030, alongside other sources including battery storage, gas, and clean coal. The transition to green energy is recognised as contributing towards the realisation of the low-carbon, climate-resilient, and inclusive economy envisaged by the National Development Plan. The development of the Brakpan 1 Solar Energy facility is identified as a mechanism for securing additional power generation capacity for private off-takers, reducing the reliance for electricity on Eskom.

The cluster of renewable energy facilities, of which the Brakpan 1 Solar Energy facility forms part, will ensure the optimisation of a supply of steady-state baseload type power, as well as play a significant role in the Just Energy Transition (“JET”) by supplying low-cost energy to the national grid. At the same time, it will contribute to a JET fund to assist in transitioning jobs from the fossil fuel sector in Mpumalanga to renewable energy. The available solar resource, proximity to the transmission infrastructure, and scale of the portfolio may also play a possible role in contributing to the hydrogen economy in South Africa, with Europe as a possible export market.

Furthermore, the solar facility will contribute to the economic recovery and reconstruction as part of the Government's plan.

The South African government has identified the green economy as one of 12 job drivers that could help contribute to creating 5 million additional jobs by 2020. The New Growth Path, in which the sectoral job targets are disaggregated, envisages that as many as 300 000 new direct jobs could be created in the areas of natural resource management and renewable energy construction (Department of Energy, 2019). The developer will implement social and economic development strategies, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-economic development. In addition to electricity generation and supply, the project will therefore also contribute positively towards socio-economic development of a region, over and above job creation.

Brakpan 1 Solar Energy facility 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, Brakpan 1 Solar Energy facility 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 Human Settlements, Water and Sanitation (now the Department Water and Sanitation) National Water Resource Strategy 2 (2013) (i.e. transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

4.2.2. Benefits of Renewable Energy in the South African Environment

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:** 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 for 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 so tight that some customers' energy supply would have had to be curtailed ('unserved') if it had not been for the renewables. The avoidance of unserved energy cumulated into the effect that during 15 days from January to June 2015, load shedding was avoided entirely, delayed, or a higher stage of load shedding was prevented due to the contribution of the wind and PV projects⁵.
- » **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 compared to the continual purchase of fuel for conventional power stations. Results of a CSIR Energy Centre study for January to June 2015 (CSIR, August

⁵ (http://ntww1.csir.co.za/plsql/ptl0002/PTL0002_PGE157_MEDIA_REL?MEDIA_RELEASE_NO=7526896)

2015) have quantified the contribution of renewable energy to the national power system and the economy over the first 6 months of 2015 compared to the 12 months of 2014:

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

The overview of the Independent Power Producers Procurement Report (March 2019) has indicated that water saving of 42.8 million kilolitres has been realised by the programme from inception until the end of March 2019, of which 3.4 million kilolitres is reported on in this 2019 reporting quarter.

- » **Exploitation of our 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 resource and competitive procurement processes, both wind power and solar PV power are now proven in South Africa as cheaper forms of energy generation 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.

The following has been achieved by the IPP programme (March 2020) in terms of investment and economics:

- * Investment (equity and debt) to the value of R209.7 billion, of which R41.8 billion (20%) is foreign investment, was attracted;
- * Created 50 984 job years⁴ for South African citizens to date;
- * Socio-economic development contributions of R1.2 billion to date, of which R88.3 million was spent in this reporting quarter; Enterprise development contributions of R365.6 million to date, of which R25.0 million was spent in this reporting quarter;
- » **Pollution reduction:** The release of by-products through the burning of fossil fuels for electricity generation has a particularly hazardous impact on human health and contributes to ecosystem degradation. The use of solar radiation or wind for power generation is a non-consumptive use of a natural resource that produces zero emissions during its operation.

The overview of the Independent Power Producers Procurement Report (March 2020) indicates that carbon emission reductions of 47.7 Mton CO₂ has been realised by the programme from inception to date, of which 2.9 Mton in the March 2020 reporting quarter.

- » **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 greenhouse gas ("GHG") emissions. South Africa is estimated to be currently 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. The renewable energy sector saved South Africa 1.4 million tons of carbon emissions over the first 6 months of 2015⁶.
- » **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 the Paris Agreement, 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. The construction phase will create temporary employment opportunities and the operation phase will create limited full-time employment opportunities.

The overview of the Independent Power Producers Procurement Report (March 2020) indicates that all IPP projects to date have created 40 134 job years for South African citizens.

- » **Acceptability to society:** Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human and ecosystem health, the use of clean energy, 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 and result in community upliftment for the affected areas.
- » **Protecting the natural foundations of life for future generations:** Actions to reduce the disproportionate carbon footprint can play an important part in ensuring the human 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.

4.3. 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. **Figure 4.2** provides an overview of the energy mix of South Africa in 2021 (Akinbami, et al, 2021).

⁶ <http://www.iol.co.za/capetimes/renewable-energy-saving-sa-billions-csir-1.1903409#.VkJNjdJq6FeU>

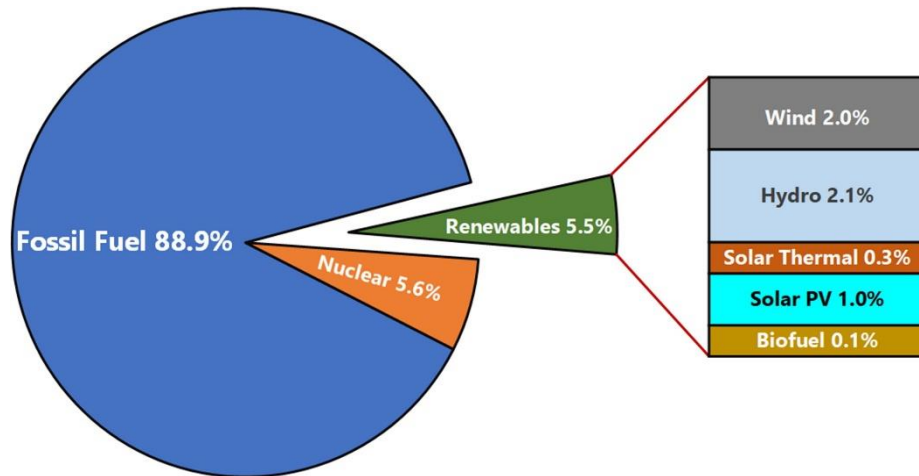


Figure 4.2: Overview of South Africa's energy mix (Source: Akinbami, et al, 2021)

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 Western Cape Province has been identified as an area where the development of solar energy facilities is a feasible and suitable option for electricity generation. The Western Cape region ranked third highest among all the provinces in terms of renewable energy (solar PV, CSP, wind, and Biomass) deployment in South Africa (refer to **Figure 4.3**).

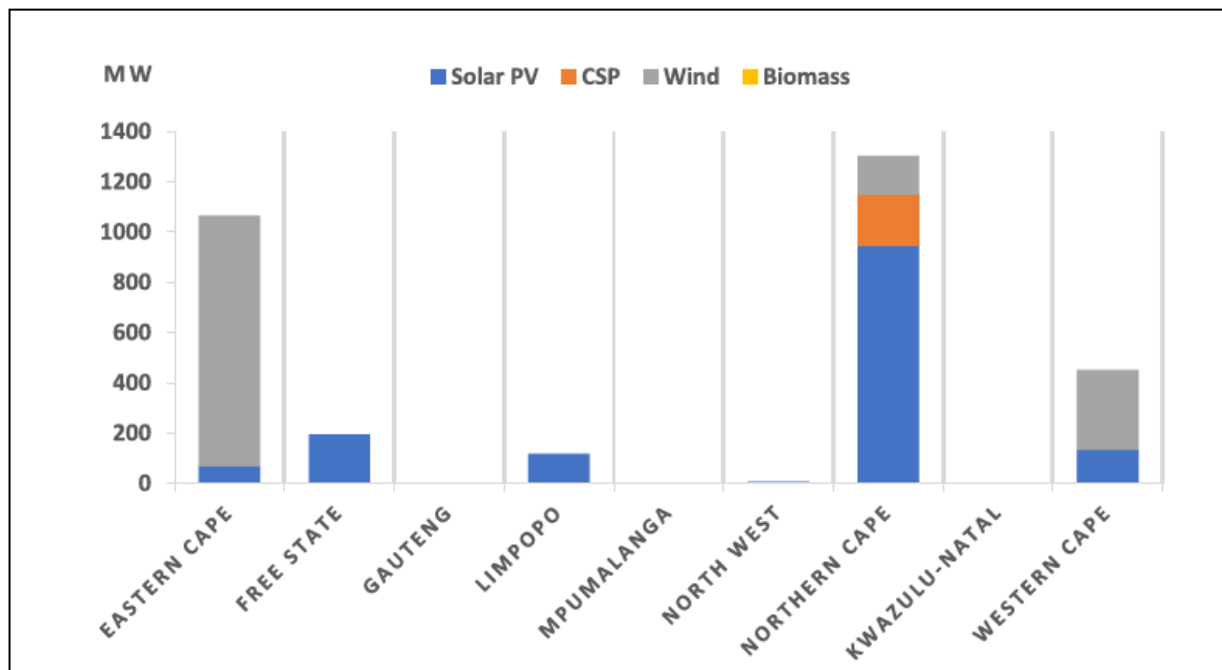


Figure 4.3: South Africa's electricity generation in MW by different technologies (source: Akinbami et al, 2021).

The Beaufort West 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, and this area is included in the Beaufort West Renewable Energy Development Zone ("REDZ 11") (an area identified for the development of commercial solar PV facilities). 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 2120kWh/m²/annum (refer to **Figure 2.2**). The project site is therefore suitably located for the proposed development.

4.4. Need and Desirability of the project from a Local Perspective

The project site for Brakpan 1 Solar Energy Facility itself has not been considered for an alternative land use such as urban development, nor is it currently used for agriculture as a result of limited potential due to scarcity of water resources. The proposed development of the site for renewable energy is therefore considered to be a suitable land use.

From a local perspective, the site has specifically been identified by the project proponent as being highly desirable for the development of a PV facility due to its suitable topography (i.e. in terms of slope and local topography), site access (i.e. to facilitate the movement of machinery during the construction phase and operations staff in the long-term), land availability (i.e. the land is secured for the intended use), the extent of the site (i.e. the land parcel can accommodate the 395 ha required for the facility) (refer to Section 2.2 for details), and enabling optimal placement of the infrastructure considering potential environmental sensitivities or technical constraints, as well as the consolidation of renewable projects within an already identified node, being within an identified REDZ. The consolidation of similar developments within an area is considered desirable. This consolidation of projects will result in a consolidation of impacts within one area rather than a spread of the impacts across a larger area, enabling focussed management and mitigation within a single area.

4.5 Conclusion

From the above, it is clear that the need and desirability for the project is supported from a planning and policy perspective on a national, provincial, district, and local level, as well as from a technical perspective when considering solar resources. It is however important to also consider the potential impacts and benefits that the proposed solar facility may have for the affected site and surrounding area from both a biodiversity sustainability perspective and a socio-economic perspective. Therefore, it is imperative for the assessment being undertaken for the project to consider this project not only from a policy (national, provincial, and local level) perspective, but also from a biodiversity and socio-economic perspective. The aim of this Basic Assessment process is to ensure a balance between these three spheres and to ensure that conclusions made regarding the proposed project draw on both the positive and negative consequences of the proposed development, as well as the potential for impacts to be compounded through the development of the solar facility and its associated infrastructure in proximity to other similar developments (i.e. cumulative impact). The potential impacts are identified and assessed in this Basic Assessment Report.

CHAPTER 5: APPROACH TO UNDERTAKING THE BASIC ASSESSMENT PROCESS

In terms of the EIA Regulations of December 2014 (amended in April 2017) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of the Brakpan 1 Solar Energy Facility ("SEF") is a listed activity requiring environmental authorisation. In terms of GNR114 of February 2018, the application for environmental authorisation is required to be supported by a BA process based on the location of the Brakpan 1 SEF project site within the Beaufort West Renewable Energy Development Zone (REDZ 11).

The BA process aims at identifying and describing potential environmental issues associated with the development of the proposed solar PV facility and 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.

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

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

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for.	All listed activities triggered as a result of the development of the Brakpan 1 SEF have been included in section 5.2, Table 5.1 . The specific project activity relating to the relevant triggered listed activity has also been included in Table 5.1 .
3(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The details of the public participation process undertaken for the Brakpan 1 SEF has been included and described in section 5.3.2.
3(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	All comments raised during the 30-day review and comment period of the BA Report and through ongoing 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 DFFE 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 the Brakpan 1 SEF has been included in section 5.4 .
(o) a description of any assumptions, uncertainties, and gaps in knowledge that relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the BA process being undertaken for the Brakpan 1 SEF is included in section 5.6 .

5.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to Brakpan 1 SEF as identified at this stage in the process are described in more detail under the respective sub-headings.

5.2.1 National Environmental Management Act (No. 107 of 1998) (“NEMA”)

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as “listed activities”. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed, and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant EA. Due to the fact that Brakpan 1 SEF is a power generation project and therefore relates to the IRP 2010 – 2030, 2019, the National Department of Forestry, Fisheries and the Environment (“DFFE”) has been determined as the Competent Authority in terms of GNR 779 of 01 July 2016. The Western Cape Department of Environmental Affairs and Development Planning (“DEA&DP”) is a 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 Brakpan 1 SEF is being undertaken in accordance with Section 24 (5) of the NEMA. Section 24 (5) of NEMA pertains to Environmental Authorisations (EAs), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of 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 11 of the Renewable Energy Development Zones (“REDZ”), i.e. Beaufort West REDZ, one of the eleven (11) designated REDZ areas, the EIA process to be followed for Brakpan 1 SEF will be as per GN R142, as formally gazetted on 26 February 2021. Brakpan 1 SEF is now subject to a Basic Assessment (“BA”) process and not a full Scoping & EIA process, as well as a shortened timeframe of 57 days for the processing of an application for an (“Environmental Authorisation”).

Table 5.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) which apply to the Brakpan 1 SEF, and for which an Application for Environmental Authorisation (“EA”) has been submitted to DFFE. The table also includes a description of the specific project activities which relate to the applicable listed activities.

Table 5.1: Listed activities as per the EIA regulations which are triggered by Brakpan 1 SEF

Activity No(s):	Relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Applicability to the project
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GNR 327 (LN1), Activity No. 11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	The project site falls outside the urban area. 33kV MV cabling and a 132kV facility substation are proposed as part of the PV facility to connect the PV facility to the Eskom electricity grid.
GNR 327 (LN1) Activity No. 12(ii)(a)(c)	The development of – (ii) Infrastructure or structures with a physical footprint of 100 square metres or more Where such development occurs- (a) within a watercourse; or (c) within 32 metres of a watercourse.	The construction and operation of the Brakpan 1 Solar Facility and associated infrastructure will occur within freshwater/drainage features, as well as within 32m of these features. The infrastructure will have a physical footprint of more than 100 square metres.
GNR 327 (LN1), Activity No. 14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	The development of the PV facility will require the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the on-site substation where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.
GNR 327 (LN1) Activity No. 19(i)	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a Watercourse.	The site for the Brakpan 1 Solar Facility is associated with the presence of freshwater/drainage features. Therefore, during the construction phase, 10 cubic metres of rock will be removed from the watercourses for the development of the PV facility and associated infrastructure.
GNR 327 (LN1) Activity No. 24(ii)	The development of a road – (ii) with a reserve wider than 13.5m, or where no reserve exists where the road is wider than 8m.	The construction of the Brakpan 1 Solar Facility will require the construction of new access roads of 12 -13m wide in areas where no road reserve exists to provide access to the facility.
GNR 327 (LN1), Activity No. 28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The total area to be developed for the proposed PV facility is greater than 1ha and occurs outside an urban area in an area currently zoned for agriculture.
56(ii)	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres.	Existing farm roads within the project site may require widening, and access roads will be widened by more than 6 metres.

Activity No(s):	Relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended	Applicability to the project
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4(i)(ii)(aa)	<p>The development of a road wider than 4 metres with a reserve less than 13.5 metres.</p> <p>i. Western Cape ii. Outside urban areas: (aa) Areas containing indigenous vegetation.</p>	<p>The development of the Brakpan 1 Solar Facility will require the development of access roads of 12 – 13m wide, and internal distribution roads up to 12m wide in the Western Cape Province and outside urban areas. The project site is associated with the presence of natural vegetation.</p>
10(i)(ii)	<p>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres</p> <p>i. Western Cape ii. All areas outside urban areas</p>	<p>The development of the Brakpan 1 Solar Facility will require the construction and operation of facilities for the storage and handling of a dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the onsite collector substation, where such storage will include containers with a capacity of 80 cubic meters. The site is located outside of urban areas.</p>
14(ii)(a)(c)(i)(i) (ff)	<p>The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more;</p> <p>where such development occurs— (a) within a watercourse; or (c) within 32 metres of a watercourse, measured from the edge of a watercourse.</p> <p>i. Western Cape i. Outside urban areas:</p>	<p>T The development of Brakpan 1 Solar Facility will require the establishment of infrastructure with a physical footprint exceeding 10m² within areas containing freshwater/drainage features. The project is located outside of an urban area.</p>
18(i)(ii)(aa)	<p>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</p> <p>i. Western Cape ii. All areas outside urban areas: (aa) Areas containing indigenous vegetation;</p>	<p>Existing farm roads within the project site may require widening, and access roads will be widened by more than 6 metres.</p>

Activity No(s):	Relevant Scoping and EIR Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended.	Applicability to the project
GNR 325 (LN2), Activity No. 1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more,	Brakpan 1 Solar PV facility will have a installed capacity of 220MWac.
GNR 325 (LN2), Activity No. 15	The clearance of an area of 20 hectares or more of indigenous vegetation,	The development of the PV facility will require the clearance of an area in excess of 20ha for the development of infrastructure.

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

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system that allows for the management of national heritage resources and empowers civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities that 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 forms of linear development or barrier exceeding 300m in length;*
 - b. *the construction of a bridge or similar structure exceeding 50m in length;*
 - c. *any development or other activity which will change the character of a site –*
 - i). *exceeding 5 000m² in extent; or*
 - ii). *involving three or more existing erven or subdivisions thereof; or*
 - iii). *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv). *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*

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

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

A Heritage Impact Assessment has been undertaken as part of the BA Process (refer to **Appendix G**).

5.3 Overview of the Basic Assessment Process for the Brakpan 1 SEF

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. DFFE) 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 ("DEA"), 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 GNR326.
- » 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 DFFE for review and decision-making.

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

5.3.1. 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 Forestry, Fisheries and the Environment ("DFFE") is the competent authority for all projects related to the IRP. As the project is located within the Western Cape Province, the Western Cape Department of Environmental Affairs and Development Planning ("DEA&DP") is the commenting authority. Consultation with the regulating authorities (i.e., DFFE and DEA&DP) 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 a Public Participation Plan for approval prior to the commencement of the process.
- » Submission of the project notification letters and application for Environmental Authorisation to the DFFE.
- » 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**.

5.3.2. Public Participation Process

Public participation is an essential regulatory requirement for an environmental authorisation process and is guided by Regulations 39 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 Interested and Affected Parties ("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 the online stakeholder engagement platform will allow for the following:

- » 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; 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, WhatsApp and SMS.
- » An adequate review period is provided for I&APs to comment on the findings of the BA Report.

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;
- » 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.

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

- » Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application;
- » Give written notice to:
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority.
- » Place an advertisement in one local newspaper.
- » Open and maintain a register of I&APs and Organs of State.
- » Release 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 the responses provided by the project team.

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 through either directly contacting the Savannah Environmental Public Participation team via email or fax or use of the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is listed in **Table 5.2**.

Table 5.2: List of Stakeholders identified for the inclusion in the project database during the public participation process for Brakpan 1 SEF

Organs of State
National Government Departments
Department of Mineral Resources and Energy ("DMRE")
Department of Forestry, Fisheries, and the Environment ("DFFE")
Department of Agriculture, Rural Development and Land Reform ("DARDLR")
Department of Water and Sanitation ("DHSWS")
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited ("Eskom")
National Energy Regulator of South Africa ("NERSA")
South African Civil Aviation Authority ("CAA")
South African National Roads Agency Limited ("SANRAL")
Square Kilometre Array Project ("SKA")
Telkom SA SOC Limited ("Telkom")
Transnet SA SOC Limited ("Transnet")
Provincial Government Departments
Western Cape Department of Environmental Affairs and Development Planning
Western Cape Department of Roads and Public Works
Heritage Western Cape
Local Government Departments
Central Karoo District Municipality
Beaufort West Local Municipality
Key Stakeholders
BirdLife South Africa
Endangered Wildlife Trust ("EWT")
SENTECH SOC Limited ("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 names of⁷:

- » all persons who requested to be registered on the database through the use of the online stakeholder engagement platform (i.e. website) or in writing and disclosed their interest in the project;

⁷ 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 (Act No. 4 of 2013).

- » all Organs of State which hold jurisdiction in respect of the activity to which the application relates; and all persons who submitted written comments or attended virtual meetings and viewed the narrated presentations on the Savannah Environmental online platform 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 ongoing for the duration of the BA process. The database of I&APs will be updated throughout the BA process and will act as a record of the I&APs involved in the public participation process.

ii. Advertisements and Notifications

- 40.(2)(a) Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of –
- (i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and
 - (ii) Any alternative site.
- 40.(2)(b) Giving written notice, in any of the manners provided for in section 47D of the Act, to –
- (i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site 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 the 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 the 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 and the BA process notification letter announcing the BA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/IAPs of Brakpan 1 SEF, providing background information of the project and inviting I&APs to register on the project's database were distributed via email on **03 June 2022**. The evidence of the distribution is contained in **Appendix C** of the BA Report. The BID is also available electronically on the Savannah Environmental website (<https://savannahsa.com/public-documents/energy-generation/brakpan-1-solar-energy-facility/>).
- » Placement of site notices announcing the BA process at visible points along the boundary of the study area (i.e. the boundaries of the affected property), in accordance with the requirements of the EIA Regulations Placed on 25, 29 & 30 May 2022 and 02 June 2022. Photographs and the GPS co-ordinates of the site notices are contained in **Appendix C2** of the BA Report and are also available on the Savannah Environmental online platform. Process notices announcing the BA were placed in Murraysburg Library, Murraysburg Police Station, Beaufort West Police Station and Beaufort West Libraray.
- » Placement of an advertisement in the Die Burger on **03 June 2022** at the commencement of the 30-day review and comment period. This advert announced the project, the BA process, the details to access the Savannah Environmental online platform, as well as the availability of the BA report on this platform and invited comment on the BA Report. This advert also included the details on the review period for the BA report. A copy of the newspaper advert as sent to the newspaper is included in **Appendix C2** of the BA Report. The newspaper advert tear sheet will be included in the Final BA Report in **Appendix C2**.
- » The BA Report has been made available for review by I&APs for a 30-day review and comment period from **03 June 2022 to 07 July 2022**.⁸ Electronic versions of the BA Report and CD copies were requested have been circulated to Organs of State via courier at the commencement of the review period. The BA Report is also available for download on the Savannah Environmental's website. The evidence of distribution of the BA Report will be included in the final BA Report, which will be submitted to the DFFE.

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 5.3: Consultation undertaken with I&APs for Brakpan 1 SEF

Activity	Date
<p>Distribution of the process notification and stakeholder reply form announcing the BA process and inviting I&APs to register on the project database.</p> <p>The BID, notification letter, and electronic reply form were also made available on the virtual platform.</p>	<p>25th May 2022 to the 02 June 2022</p>

⁸ Given unforeseen circumstance the advertised review period (04 April to 09 May 2022) was extended to 12 May 2022.

Placement of site notices on-site and in public places (Local Municipality and Home Affairs).	Placed on 25, 29 & 30 May 2022 and 02 June 2022
Advertising of the availability of the BA Report for a 30-day review period in the Die Burger newspaper, including details on how to access the online platform and the BA Report via this means.	03 June 2022
Distribution of notification letters announcing the availability of the BA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	03 June 2022
30-day review and comment period of the BA Report.	03 June 2022 to 07 July 2022
Virtual Meetings through virtual presentations on the Savannah Environmental Virtual Platform: <ul style="list-style-type: none"> » Registered I&APs making use of the online platform » Adjacent Landowners <p>Authorities and key stakeholders (including Organs of State, local municipality and community-based organisations.</p> <p>Where an I&AP does not have access to a computer and/or internet to view the virtual presentation telephonic discussions will be set-up to provide the presentation electronically with the discussion being recorded and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions.</p>	To be undertaken during the 30-day review period
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs	Throughout BA process

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 sub regulation (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 via e-mail of the release of the BA Report for a 30-day review and comment period, invited to provide comment on the BA Report, and informed of the manner in which, and the timeframe within which such comment must be made. The report

has been made available for download from the Savannah website and in CD format (where requested). Where requested, hard copy reports will be provided

Where I&APs were not able to provide written comments, other means of consultation, such as telephonic discussions were used to provide the I&APs with a platform to verbally raise their concerns and comments on the proposed development. Submission of comments and queries were also enabled through the use of the Savannah Environmental website. The comments raised during the discussions and written comments have been recorded and included in **Appendix C8** of the BA Report.

v. Identification and Recording of Comments

Comments raised by I&APs over the duration of the BA process will be synthesised into a Comments and Responses (C&R) Report. The C&R Report will consist of written comments received as well as responses from the project proponent, EAP, and specialist consultants, where relevant. The C&R Report will be updated with all comments received during the 30-day review and comment period and will be included as **Appendix C8** in the final BA Report that will be submitted to the DFFE for decision-making.

Notes of all the telephonic discussions held and minutes of meetings conducted during the 30-day review and comment period of the BA Report will be included in **Appendix C7**.

5.4 Assessment of Issues Identified through the BA Process

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

The requirement for the submission of a Screening Report (**Appendix L**) for the proposed development is applicable as it triggers Regulation 19 of the 2014 EIA Regulations (as amended). **Table 5.5** provides a summary of the specialist assessment requirements identified for the project site in terms of the screening tool and responses to each assessment requirement based on the nature and extent of the project.

Table 5.5: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of Brakpan 1 SEF

Specialist Theme	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural	Medium	A Soils and Agricultural Compliance Statement is included in Appendix F .
Aquatic Biodiversity	Low	Assessment of impacts on aquatic biodiversity is included in the Ecology Assessment (Appendix D)

Specialist Theme	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Archaeological & Cultural Heritage	Low	A Heritage Impact Assessment Report, including an assessment of impacts on archaeology and cultural landscape, is included in Appendix G
Avian	Low	An Avifauna Impact Assessment has been undertaken for the PV facility and is included in Appendix E .
Civil Aviation	Low	The Civil Aviation Authority and ATNS will be consulted throughout the BA process to obtain input.
Defence	Low	A defence or military base is not located within close proximity to the PV facility.
Palaeontology	Very High	A Heritage Impact Assessment (which covers palaeontological aspects of the project site) is included in Appendix G .
RFI Theme	Low	The project site under consideration is not located within close proximity to telecommunications towers.
Terrestrial Biodiversity	Low	Terrestrial Biodiversity (including flora and fauna) Assessments have been undertaken for the PV facility and are included as Appendix D .
Plant Species	Medium	
Animal Species	High	
Geotechnical	No rating is provided in the screening tool	A preliminary geotechnical investigation has been undertaken by the applicant during the feasibility study to identify the development area (see Chapter 2 of this BA Report). A detailed geotechnical survey will be undertaken prior to construction during the detailed design phase once preferred bidder status is obtained. Contractors and suppliers will only be selected and appointed after preferred bidder status is obtained. In line with best practice, and to ensure that all aspects are covered in the assessment, suppliers of civil structures are required to provide input into the scope of work of the Geotechnical Assessment. Therefore, a detailed Geotechnical Assessment can only be undertaken during detailed design.

Based on the outcomes of the screening, and from experience on similar projects and in the study area, the EIA project team has identified the following issues as requiring investigation.

Table 5.6: Issues identified for investigation and specialist consultants appointed to evaluate the potential impacts associated with Brakpan 1 SEF

Issue/Assessment	Specialist Name	Specialist Company	Appendices
Biodiversity Impact Assessment	Mahomed Desai	The Biodiversity Company	Appendix D
Avifauna Impact Assessment	Ashlin Bodasin	Arcus Consultancy Service	Appendix E
Soils Compliance Statement	Matthew Mamera	The Biodiversity Company	Appendix F
Heritage Impact Assessment	Jenna Lavin	CTS Heritage	Appendix G

Issue/Assessment	Specialist Name	Specialist Company	Appendices
	Nicholas Willtshire		
Visual Impact Assessment	Bryony Van Niekerk Lourens du Plesses	NuLeaf Planning and Environmental & LOGIS	Appendix H
Traffic Impact Assessment	Iris Wink	JG Africa	Appendix J
Social Impact Assessment	Tony Barbour	Tony Barbour Environmental and Social Assessment Consultant	Appendix I

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the Brakpan 1 SEF. 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 very short duration (0–1 years) – assigned a score of 1;
 - * The lifetime of the impact will be of short duration (2-5 years) - assigned a score of 2;
 - * Medium-term (5–15 years) – assigned a score of 3;
 - * Long term (> 15 years) - assigned a score of 4;
 - * Permanent - assigned a score of 5.
- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - * 0 is small and will have no effect on the environment;
 - * 2 is minor and will not result in an impact on processes;
 - * 4 is low and will cause a slight impact on processes;
 - * 6 is moderate and will result in processes continuing but in a modified way;
 - * 8 is high (processes are altered to the extent that they temporarily cease);
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - * Assigned a score of 3 is probable (distinct possibility);
 - * Assigned a score of 4 is highly probable (most likely);
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- » The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- » The **status**, which is described as either positive, negative or neutral;
- » The degree to which the impact can be reversed;
- » The degree to which the impact may cause irreplaceable loss of resources;
- » The degree to which the impact can be mitigated.

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

$S = (E+D+M) P$; where
S = Significance weighting.
E = Extent.
D = Duration.
M = Magnitude.
P = Probability.

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

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

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

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

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

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

5.6 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 footprint for the solar PV facility identified by the developer represents a technically suitable site for the establishment of the Brakpan 1 SEF 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 – I** for specialist study-specific limitations.

5.7 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 GNR R326 in Government Gazette No 40772 of April 2017);
- » Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations;
- » Department of Environmental Affairs (2017), Integrated Environmental Management Guideline: Guideline on Need and Desirability;
- » Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation; and
- » International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

Table 5.7 provides an outline of the legislative permitting requirements applicable to Brakpan 1 SEF as identified at this stage in the project development process.

Table 5.7: Applicable Legislation, Policies and/or Guidelines associated with the development of Brakpan 1 SEF

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 Beaufort West Renewable Energy Development Zone (REDZ 11) and the requirements GG 44191 of 26 February 2021, a Basic Assessment Process is required to be undertaken for</p>	<p>DFFE – Competent Authority</p> <p>Western Cape DEA&DP – Commenting Authority</p>	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 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>the 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>DFFE</p> <p>Western Cape DEA&DP</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, Northwest, 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>DFFE</p> <p>Western Cape DEA&DP</p> <p>Central Karoo District Municipality</p>	<p>Noise impacts are expected to be associated with the construction phase of the project. As the site is located a great distance from noise sensitive receptors and communities, 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>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Water Act (No. 36 of 1998) (NWA)</p>	<p>A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under 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 flow in a watercourse (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).</p>	<p>Regional Department of Water and Sanitation</p>	<p>Several non-perennial drainage features are present within the development area and within close proximity of the development area. In addition, there is the possibility that water would be abstracted from groundwater for construction and operation.</p> <p>The project proponent would need to apply for a WUL or register a GA with the DWS should any trigger water use activities be undertaken.</p>
<p>Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)</p>	<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</p>	<p>Department of Mineral Resources and Energy</p>	<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 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 to ensure that the</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)</p>	<p>any such object must apply to the Minister for approval in the prescribed manner.</p> <p>The National Dust Control Regulations (GNR 827) published under Section 32 of NEM: AQA prescribes 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>	<p>Western Cape DEA&DP / Central Karoo District Municipality</p>	<p>proposed development does not sterilise a mineral resource that might occur on site.</p> <p>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, Brakpan 1 SEF is not anticipated to result in significant dust generation.</p>
<p>National Heritage Resources Act (No. 25 of 1999) (NHRA)</p>	<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 that require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and</p>	<p>Heritage Western Cape</p>	<p>No archaeological resources of significance were identified within the area proposed for development although the broader area has archaeological significance in terms of the sensitive dolerite outcrops in the area (Appendix G). No impacts to significant archaeological heritage are anticipated.</p> <p>Five observations of palaeontological significance were noted within the area proposed for development. Three of these have higher levels of significance and are graded IIIB. These paleontological resources must be collected by a</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>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>palaeontologist under an approved work plan prior to construction.</p> <p>There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of a renewable energy facility in this location is supported from a heritage perspective provided that the infrastructure is located in areas able to tolerate the impact of the high degree of change from a cultural landscape perspective.</p> <p>As such, the development of Brakpan 1 SEF is not associated with any fatal flaws from a heritage, archaeological and palaeontological perspective, and it is for this reason that the project is considered to be acceptable.</p> <p>Should a heritage resource be impacted upon, a permit may be required from SAHRA or Heritage Western Cape in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GNR 668). This will be determined 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>DFFE</p>	<p>Under NEM:BA, a permit would be required for any activity which is of a nature that</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<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>Western Cape DAEARD&LR</p>	<p>may negatively impact on the survival of a listed protected species.</p> <p>The Ecological Impact Assessment (Appendix D) identified listed species. Based on the SANBI POSA records for the site and surrounding area, 7 species of conservation concern are potentially present on the site.</p> <ul style="list-style-type: none"> » Aizoaceae (<i>Ruschia intricata</i>) » Aizoaceae (<i>Ruschia spinosa</i>) » Aizoaceae (<i>Trichodiadema</i> sp). » Amaryllidaceae (<i>Ammocharis coranica</i>) » Hyacinthaceae (<i>Dipcadi</i> sp).
<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>DFFE</p> <p>Western Cape DAEARD&LR</p>	<p>Restricted Activities and the respective requirements applicable to persons in control of different categories of listed invasive species are contained within the Alien and Invasive Species Regulations (GNR 598) published under NEM:BA, together with the requirements of the Risk Assessment to be undertaken.</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>Department of Agriculture, Land Reform and Rural</p>	<p>CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>Regulation 15 of GNR 1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur.</p> <p>Regulation 15E of GNR 1048 published under CARA provides requirements and methods to implement control measures for different categories of alien and invasive plant species.</p>	<p>Development ("DALRRD")</p>	<p>strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented.</p> <p>The permission of DALRRD and Western Cape Department of Agriculture will be required if Brakpan 1 SEF requires the draining of vleis, marshes or water sponges on land outside urban areas. However, this is not anticipated to be relevant for the project.</p> <p>In terms of Regulation 15E (GNR 1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods:</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 accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<p>plants concerned, subject to the provisions of sub-regulation (4).</p> <p>» 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>
<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>DFFE</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 indicated that protected species occur on the site. A license in terms of the NFA will be required for impacting on the protected species identified at the site, (refer to Appendix D of this BA Report).</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</p>	<p>DFFE</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of Brakpan 1 SEF, in terms of the preparation and maintenance of firebreaks, and the need</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>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 a fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.</p>		<p>to provide appropriate equipment and personnel for firefighting purposes.</p>
<p>Hazardous Substances Act (No. 15 of 1973) (HAS)</p>	<p>This Act regulates the control of substances that may cause injury, ill health, or death due to their toxic, corrosive, irritant, strongly sensitising, or inflammable nature of 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 	<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>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<ul style="list-style-type: none"> » 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>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>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 is prevented. 	<p>DFFE – hazardous waste</p> <p>Western Cape DEA&DP – general waste</p>	<p>No listed activities are triggered by Brakpan 1 SEF and therefore no Waste Management License is required to be obtained. General and hazardous waste handling, storage, and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM :WA will need to be considered in this regard.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Road Traffic Act (No. 93 of 1996) (NRTA)	<p>The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and 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 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>	<p>SANRAL – national roads</p> <p>Western Cape Department: Transport and Public Works</p>	<p>An abnormal load / vehicle permit may be required to transport the various components to the site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation components may not meet specified dimensional limitations (height and width).</p>
Provincial Policies / Legislation			
Western Cape Nature Conservation Ordinance (Act No. 19 of 1974)	<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 offenses 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; 	Cape Nature	<p>A collection/destruction permit must be obtained from Cape Nature for the removal of any protected plant or animal species found on site.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<ul style="list-style-type: none">» Aquatic habitats may not be destroyed or damaged;» The owner of the land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Act provides lists of protected species for the Province.		

5.7.2 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 ("BLSA") and the Endangered Wildlife Trust ("EWT")) 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, 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, 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, e.g. at a large developments located in a sensitive habitat, or which otherwise may have significant impacts on avifauna). **Table 5.8** is taken from the best practice guidelines and provides a summary of the recommended assessment regimes in relation to proposed solar energy technology, project size, and likely risk).

Table 5.8: 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 the 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 considered 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. wetlands, nesting, or roost sites) of regional or national significance.
- 2) A population of a priority species that are 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 Brakpan 1 SEF study area, including the development area, has been classified as a Regime 2 site, as the area has been defined as a medium sensitivity area in terms of the BirdLife South Africa Guidelines. Two surveys were undertaken (July 2021 and November 2021) to inform the Avifauna Impact Assessment.

5.7.2 The IFC EHS Guidelines

The IFC EHS Guidelines are technical reference documents with general and specific 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 and project and should take into consideration site-specific variables which may be applicable, such as host country context, and the assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

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

5.7.4 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 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:

i) 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 to minimise the risk of preventable accidents leading to injuries and/or fatalities. Proper OHS risk identification and management measures should be incorporated into 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 Brakpan 1 SEF and attached as **Appendix K** to this BA Report.

ii) 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:

Water will be required for the construction and operation phases of the facility. Water will be abstracted from existing onsite boreholes or via municipal supply. The water requirements for the cleaning operations will be minimal for the 220MWp plant

iii) Land Matters

As solar power is one of the most land-intensive power generation technologies, land acquisition procedures and in particular the avoidance of 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 and construction camps (if any). 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:

Brakpan 1 SEF and its associated infrastructure is proposed on privately owned properties. A landowner/lease agreement has been entered into between the IPP and the respective landowners to provide for the utilisation of the land for the development of the solar facility and its associated infrastructure. No involuntary land acquisition or resettlement is required or will take place as a result of the project.

iv) 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 Brakpan 1 SEF have been assessed as part of the Visual Impact Assessment specialist study 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 H** to this BA Report.

v) 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 impacts associated with the development of Brakpan 1 SEF have been assessed as part of the Ecology Impact Assessment (refer to Appendix D) and Avifauna Impact Assessment (refer to **Appendix 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 impacts have been identified, and are contained within the EMPr prepared for the project and attached as **Appendix K** to this BA Report. Areas of ecological importance are reflected in an environmental sensitivity map prepared for the project (refer to Chapter 9) and have been utilised to inform the development layout.

vi) 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 the Brakpan 1 SEFSEF have been assessed as part of the Heritage Impact Assessment conducted as part of the BA process, which includes the consideration of heritage, archaeological, cultural, cultural landscape, and palaeontological resources. Measures with which to avoid, or if avoidance is not possible minimise, and mitigate any negative heritage impacts have been identified and are contained within the EMPr prepared for the project and attached as **Appendix G** to this BA Report.

vii) 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. Onsite access tracks should be permeable and developed to minimise disturbance to agricultural land. 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:

A Traffic Impact Assessment has been undertaken for the project (refer to Appendix J. The project site can be readily accessed via existing access roads in the region (access road to site from the existing Minor Road OP9212, off a District gravel road between Nelspoort and Murraysburg No. MR 587). Within 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.

viii) 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 J to this BA Report.

ix) 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 the 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 ongoing 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, and adverse impacts on, the affected communities.

Response:

A Public Participation Process as prescribed by Chapter 6 of the 2014 EIA Regulations (GNR 326) 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.

x) 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, the introduction of periodic community engagement activities, implementation of a 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 EMPr prepared for the project and attached as Appendix M to this BA Report.

CHAPTER 6: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This Chapter describes the environment that may be affected by the development of the Brakpan 1 Solar Energy Facility ("SEF"). The information is provided to assist the reader in understanding the pre-development environment and 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 the Brakpan 1 SEF 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.

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
(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 the Brakpan 1 SEF are included in this chapter. The environmental attributes that are assessed within this chapter include the following:</p> <ul style="list-style-type: none"> » The regional setting of the Brakpan 1 SEF is described in section 6.2. » The climatic conditions of Beaufort West and the study area are included in section 6.3. » Biophysical characteristics of the development area, study area and the surrounding areas are described in sections 6.3 and section 6.4. These include landscape features such as geology, soil and land types and biodiversity (i.e., ecology ((including fauna & flora)) and avifauna) of the area to be affected by the development of the Brakpan 1 SEF. » Heritage resources, including the archaeology and palaeontology of the study area and development area are described in section 6.5. » The visual quality of the affected area surrounding Brakpan 1 Solar Energy facility is described in section 6.6. » Social characteristics of the area surrounding the Brakpan 1 SEF are described in section 6.7. » A description of the site accessibility of the study area and the surrounding areas is included in section 6.8.

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

6.2 Regional Setting

The Western Cape is located on the southern tip of the African continent between the Indian and Atlantic Oceans. It is bordered by the Northern and Eastern Cape Provinces. The region is topographically and climatically diverse. It has a temperate southern coastline fringed with mountains. To the north it stretches deep into the Karoo plateau, while the west coast is extremely dry.

The Western Cape is the fourth-largest province in South Africa and covers an area of 129 462km² and also ranks fourth in population with a population of 6 279 730. The capital city is Cape Town. Other major cities and towns include George, Knysna, Paarl, Swellendam, Oudtshoorn, Stellenbosch, Worcester, Mossel Bay and Strand.

The Western Cape is divided into one metropolitan municipality (City of Cape Town Metropolitan Municipality) and five district municipalities, which are further subdivided into 24 local municipalities. (Refer to **Figure 6.3**).

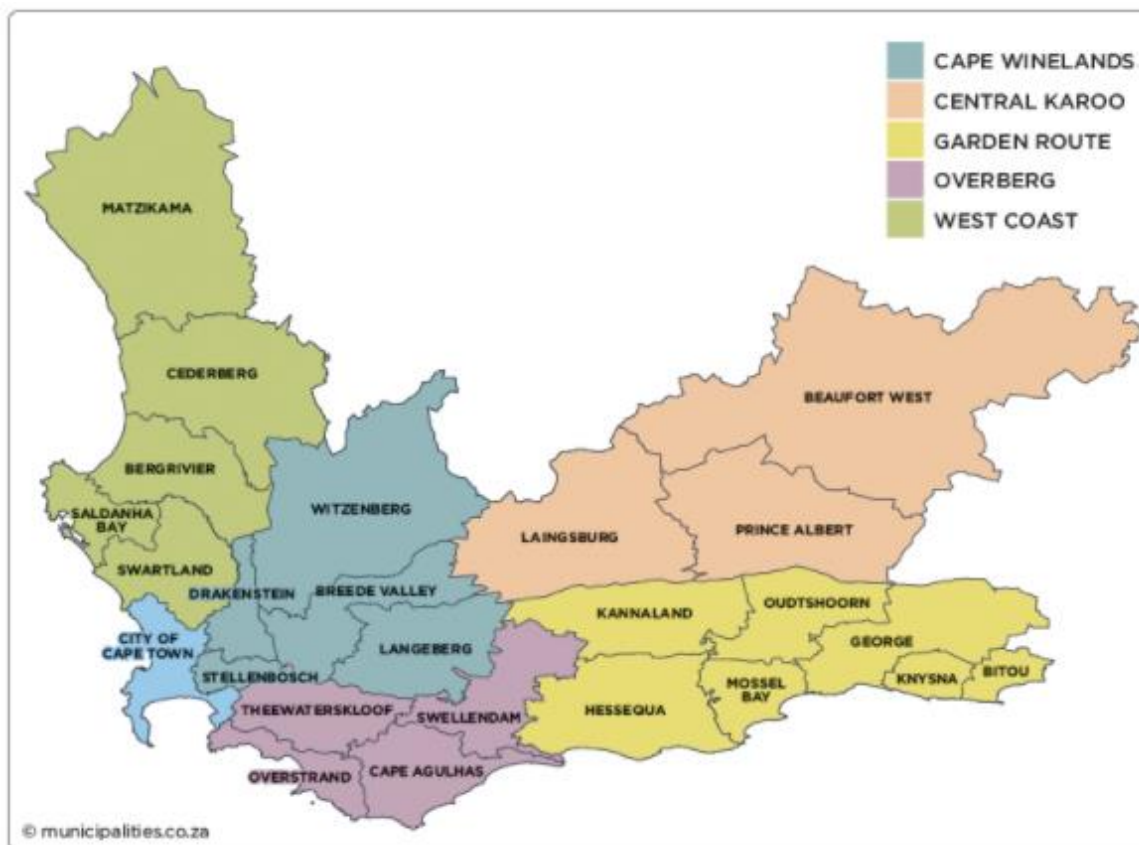


Figure 6.3: Districts of the Western Cape Province (Source: Municipalities of South Africa).

The Central Karoo District Municipality within which the study area is located is a Category C municipality covering an area of 38 854km² bordered by the Northern Cape to the north. Adjacent municipalities are the Pixley Ka Seme District Municipality in the north, Namakwa District Municipality in the north-west, Garden Route District Municipality in the south, Sarah Baartman District Municipality in the east and Cape Winelands District Municipality in the west. Major towns in the district include Beaufort West, which is the seat of the district, Klaarstroom, Laingsburg, Leeu Gamka, Matjiesfontein, Merweville, Murraysburg, Nelspoort, Prince Albert, Welgemoed. Agriculture (47%), finance and business services (22%), community services (19%), construction (7%) are the main economic activities of the district.

The District Municipality comprises of 3 Local Municipalities, namely: Laingsburg, Prince Albert, and Beaufort West Local Municipalities (refer to **Figure 6.4**).



Figure 6.4: Local Municipalities which fall within the jurisdiction of the Central Karoo District (Source: Municipalities of South Africa).

The Beaufort West Local Municipality makes up three quarters of the geographical area of the Central Karoo District Municipality. The main towns in the municipality are Beaufort West and Nelspoort. Agriculture, finance, construction, community services are the main economic sectors of the municipality.

6.3 Local Setting: Location and Description of the Study Area and Project site

The closest town to the proposed development is Nelspoort, located approximately 15km north-west of the project site. Other towns in proximity of the project site include Beaufort West located approximately 60km south-west of the project site. The Project site is located within the Beaufort West Renewable Energy Development Zone ("REDZ 11") and the Central Transmission Corridor. Built infrastructure within and around the project area, although limited, include power lines, and regional roads.

Prominent/major road systems within the area include the N1 approximately 34km west of the project site, and the access road to site from the existing District gravel road between Nelspoort and Murraysburg No. MR 587

6.4 Climatic Conditions

The project area is located within an arid region, as it is located in the rain shadow of the Cape Fold Mountains, specifically the Groot Swartberg Mountain Range, to the south. Based on the Köppen climate classification, the climate of the project area is classified as Cold desert climate (BWk) and Cold semi-arid climate (BSk). Regions classified as BWk usually feature hot, dry summers, though summers are not typically as hot as hot-desert climates. Unlike hot desert climates, cold desert climates tend to feature cold, dry winters. Cold desert climates are typically found at higher altitudes than hot desert climates and are usually drier than hot desert climates. BSk regions tend to be located in elevated portions of temperate zones, typically bordering a humid continental climate or a Mediterranean climate. They are typically found in continental interiors some distance from large bodies of water. Cold semi-arid climates usually feature warm to hot dry summers, though their summers are typically not quite as hot as those of hot semi-arid climates. Unlike hot semi-arid climates, areas with cold semi-arid climates tend to have cold winters. These areas usually see some snowfall during the winter, though snowfall is much lower than at locations at similar latitudes with more humid climates.

Specific climate data for the project area was obtained from <https://en.climate-data.org/>. No data was available for the specific region and the data provided for the town of Beaufort West was used. January is the hottest month of the year with a mean temperature of 24.0 °C. The lowest mean temperature is recorded in July, at 11.1 °C. Most precipitation occurs during March (early Autumn), with an average of 57 mm. Precipitation is the lowest in June, with an average of 15 mm.

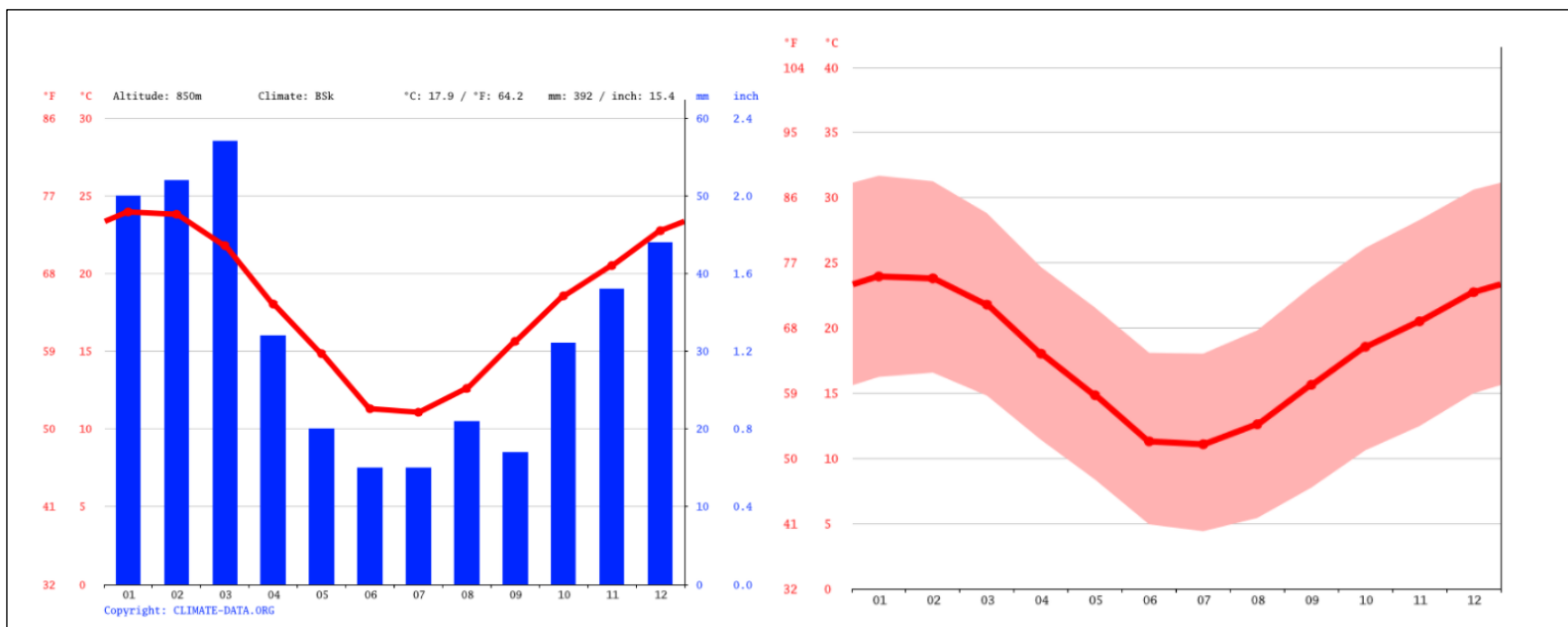


Figure 6.3: Climate and Temperature graphs for Beaufort West, Western Cape Province (Source: en.climate data.org).

Table 6.1: Climate data for Beaufort West area, Western Cape Province (Source: en.climate-data.org).

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	91°F	90°F	86°F	78°F	71°F	66°F	66°F	69°F	75°F	80°F	83°F	88°F
Temp.	78°F	77°F	73°F	65°F	58°F	52°F	52°F	55°F	61°F	66°F	71°F	75°F
Low	64°F	64°F	60°F	53°F	46°F	40°F	39°F	42°F	47°F	52°F	58°F	62°F

6.5 Landscape features

The study area is located on flat land with an elevation of 960-1000m above sea level (a.s.l.). The Rooiberg koppie is to the west and southwest of the site where the elevation is 1320m a.s.l.

Land cover on the site itself consists predominately of shrubland and bare rock and soil. Scattered areas of wetlands, grassland and, old fields lie to the east of the proposed site. The study area is located predominately within the Nama Karoo biome, with rainfall ranging from 123 mm -248 mm per annum. The vegetation type is classified as Gamka Karoo which is a low-lying vegetation type with small portions of Southern Karoo Riviere.

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

6.7 Topography, Soil and Land, Types

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Fc 396 land type. The Ae land types are characterised by Glenrosa and Mispah soil forms according to the Soil Classification Working Group, (1991) with the possibility of other soils and bare rocky areas also commonly occurring within the terrain. There are shallow and rocky profiles in the upper terrains. Lime is present in the entire landscape. The land terrain units for the featured Fc 396 land type are illustrated in Figure 6.4 with the expected soils listed in Table 6.2.

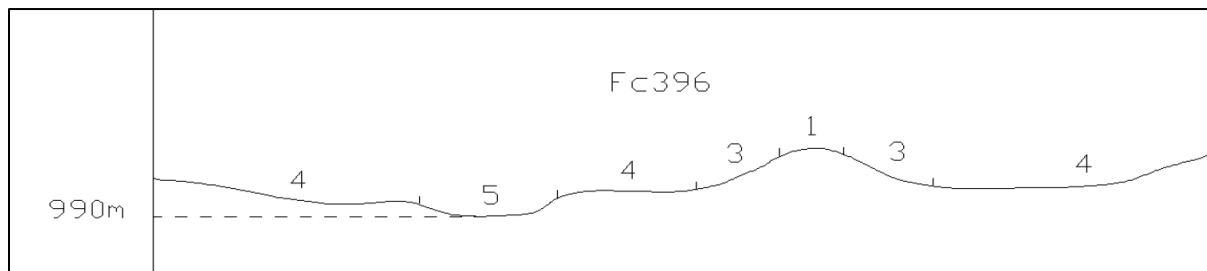


Figure 6.4. Illustration of land type Fc 396 terrain unit (Land Type Survey Staff, 1972 - 2006)

Soil and Geology

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ae 76 land type. The Ae land types are characterised by Hutton, Oakleaf and, Glenrosa soil forms with red to yellow apedal and freely drained soils according to the Soil Classification Working Group, (1991) with the possibility of other soils and bare rocky areas also occurring within the terrain. Deeper red mesotrophic and eutrophic soils high in base status also occur in the area, associated with shallow and rocky profiles in the upper terrains. Lime is mostly absent in the upper areas and can occur in the lower areas. The land terrain units for the featured Ae 76 land type are illustrated in Table 6.2.

Table 6.2. Soils expected at the respective terrain units within the Fc 396 land type (Land Type Survey Staff, 1972 - 2006)

		Terrain Units					
1 (8%)		3 (6%)		4 (50%)		5(36%)	
Bare rocks	42%	Bare Rocks	60%	Glenrosa	40%	Glenrosa	60%
Mispah	30%	Mispah	35%	Swartland	20%	Swartland	20%
glenrosa	25%	Glenrosa	5%	Mispah	20%	Hutton	10%
Swartland	3%			Bare Rocks	10%	Oakleaf	10%
				Hutton	10%		

Terrain

The slope percentage of the project area has been calculated and is illustrated in **Figure 6.5**. Most of the project area is characterised by a slope percentage between 0 and 10%, with some smaller patches within the project area characterised by a slope percentage ranging from 10 to 30%. This illustration indicates a non-uniform topography in a few scattered areas most of the area being characterised by a gentle slope. The DEM of the project area indicates an elevation of 991 to 1153 Metres Above Sea Level (MASL).

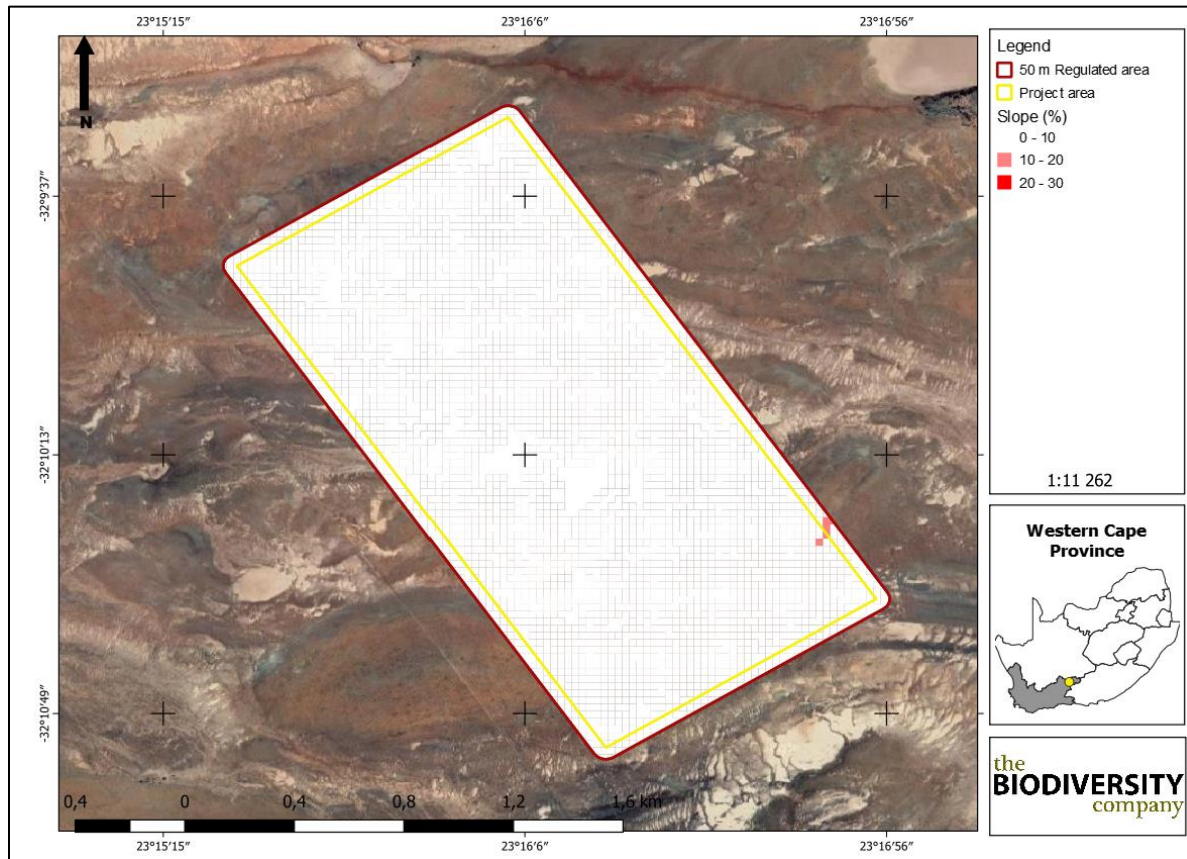


Figure 6.5 The slope percentage calculated for the project area

6.8 Agricultural Potential & Land Capability

Given the nature of the compliance statement and the fact that baseline findings correlate with the screening tool's sensitivities, the land capability was solely determined using the National Land Capability Evaluation Raster Data Layer (DAFF, 2017). Land capability and land potential will also briefly be calculated to match that of the screening tool to ultimately determine the accuracy of the land capability sensitivity from (DAFF, 2017).

Land capability and agricultural potential will briefly be determined by a combination of soil, terrain, and climate features. Land capability is defined by the most intensive long-term sustainable use of land under rain-fed conditions. At the same time, an indication is given about the permanent limitations associated with the different land use classes.

Land capability is divided into eight classes, and these may be divided into three capability groups. Table 6.3 shows how the land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use increases from class I to class VIII (Smith, 2006).

Table 6.3. Land capability class and intensity of use (Smith, 2006)

Land Capability Class	Increased Intensity of Use									Land Capability Groups
	W	F	LG	MG	IG	LC	MC	IC	VIC	
I	W	F	LG	MG	IG	LC	MC	IC	VIC	Arable Land
II	W	F	LG	MG	IG	LC	MC	IC		
III	W	F	LG	MG	IG	LC	MC			
IV	W	F	LG	MG	IG	LC				
V	W	F	LG	MG						Grazing Land
VI	W	F	LG	MG						
VII	W	F	LG							Wildlife
VIII	W									
W - Wildlife		MG - Moderate Grazing			MC - Moderate Cultivation					
F- Forestry		IG - Intensive Grazing			IC - Intensive Cultivation					
LG - Light Grazing		LC - Light Cultivation			VIC - Very Intensive Cultivation					

The land potential classes are determined by combining the land capability results and the climate capability of a region as shown in Table 6.4. The final land potential results are then described in Table 6.5.

Table 6.4. The combination table for land potential classification

Land capability class	Climate capability class							
	C1	C2	C3	C4	C5	C6	C7	C8
I	L1	L1	L2	L2	L3	L3	L4	L4
II	L1	L2	L2	L3	L3	L4	L4	L5
III	L2	L2	L3	L3	L4	L4	L5	L6
IV	L2	L3	L3	L4	L4	L5	L5	L6
V	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei
VI	L4	L4	L5	L5	L5	L6	L6	L7
VII	L5	L5	L6	L6	L7	L7	L7	L8
VIII	L6	L6	L7	L7	L8	L8	L8	L8

Table 6.5 The Land Potential Classes.

Land potential	Description of land potential class
L1	Very high potential: No limitations. Appropriate contour protection must be implemented and inspected.
L2	High potential: Very infrequent and/or minor limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.

L3	Good potential: Infrequent and/or moderate limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L4	Moderate potential: Moderately regular and/or severe to moderate limitations due to soil, slope, temperatures, or rainfall. Appropriate permission is required before ploughing virgin land.
L5	Restricted potential: Regular and/or severe to moderate limitations due to soil, slope, temperatures, or rainfall.
L6	Very restricted potential: Regular and/or severe limitations due to soil, slope, temperatures, or rainfall. Non-arable
L7	Low potential: Severe limitations due to soil, slope, temperatures, or rainfall. Non-arable
L8	Very low potential: Very severe limitations due to soil, slope, temperatures, or rainfall. Non-arable

6.9 Hydrology and Surface Water

The proposed development is located within the Sout and Kariega River catchments. There are numerous minor drainage lines that are located within the project area, and these systems drain into the Sout and Kariega Rivers (**Figure 6.7**).

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) 2018. Ecosystem Threat Status (ETS) of river ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer et al., 2019; Skowno et al., 2019). The reaches of the river systems that were assessed within the scope of the SAIIAE that traverse the project area are categorised as LT, EN and CR (**Figure 6.7**).

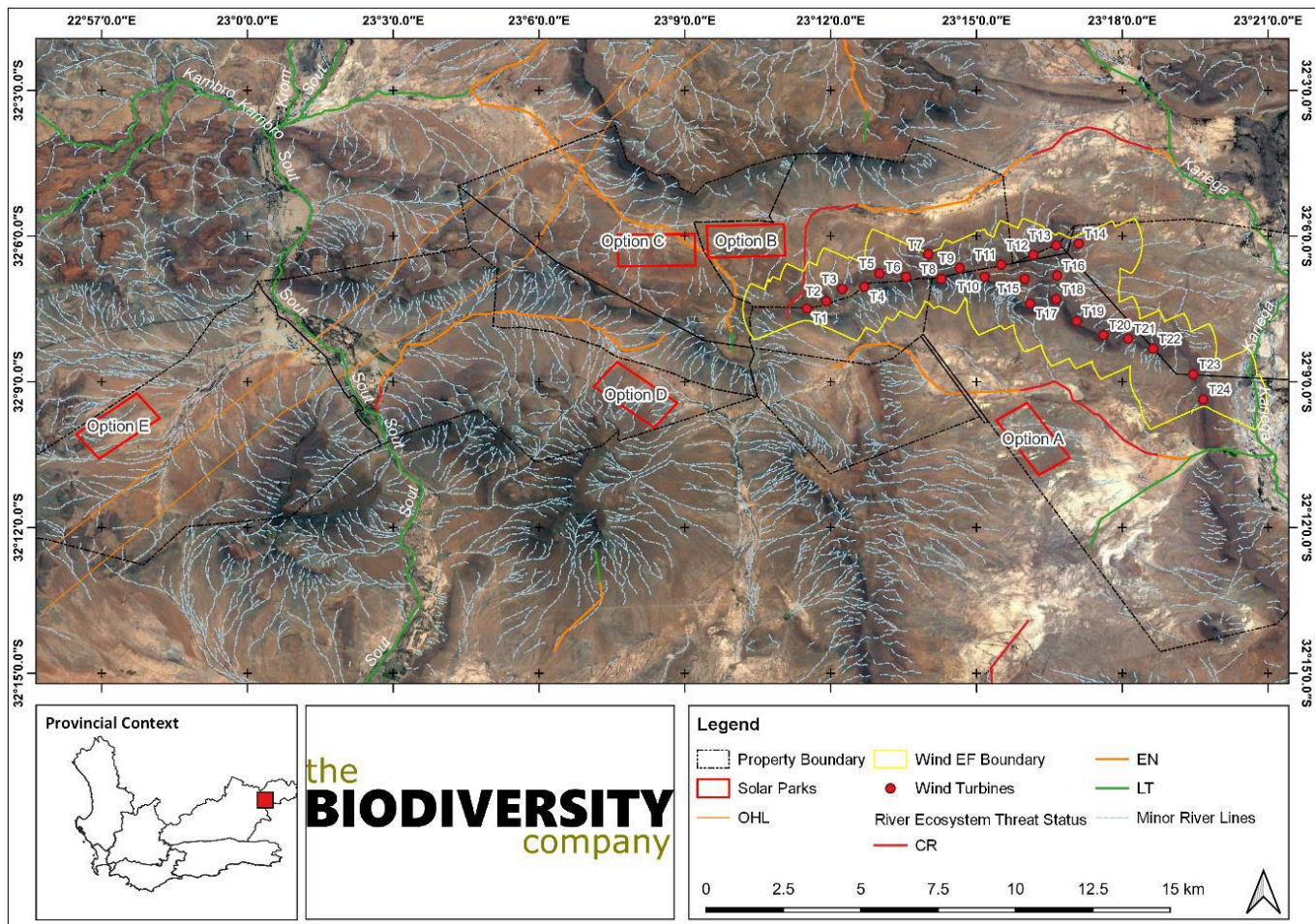


Figure 6.7: Map illustrating the hydrological setting of the Poortjie Wes Renewable Energy Facilities project area (Map reference: The Biodiversity Company, 2021. Poortjie Wes Renewable Energy Facilities – Screening Survey)

6.10 Ecological Profile of the Study Area and Development Area

The project area is within the Nama Karoo Biome, that is a large, landlocked region on the central plateau of the western half of South Africa and extends into south-eastern Namibia. This is an arid biome with majority of the river systems being non-perennial. Apart from the Orange River and the few permanent streams in the southwest that originate in higher-rainfall neighbouring areas, the limited number of perennial streams that originate in the Nama-Karoo are restricted to the more mesic east. The low precipitation is unreliable (coefficient of variation of annual rainfall up to 40%) and droughts are unpredictable and prolonged. The unpredictable rainfall impedes the dominance of leaf succulents and is too dry in summer for dominance by perennial grasses alone, and the soils are generally too shallow, and the rainfall is too low for trees. Unlike other biomes of southern Africa, local endemism is very low and consequently, the Nama-Karoo Biome does not contain any centre of endemism.

the proposed development footprints are located within the Gamka Karoo and Upper Karoo Hardeveld (Figure 6.8). Notably, within the Nama Karoo Biome, the highest number of local endemics is concentrated in the Upper Karoo Hardeveld.

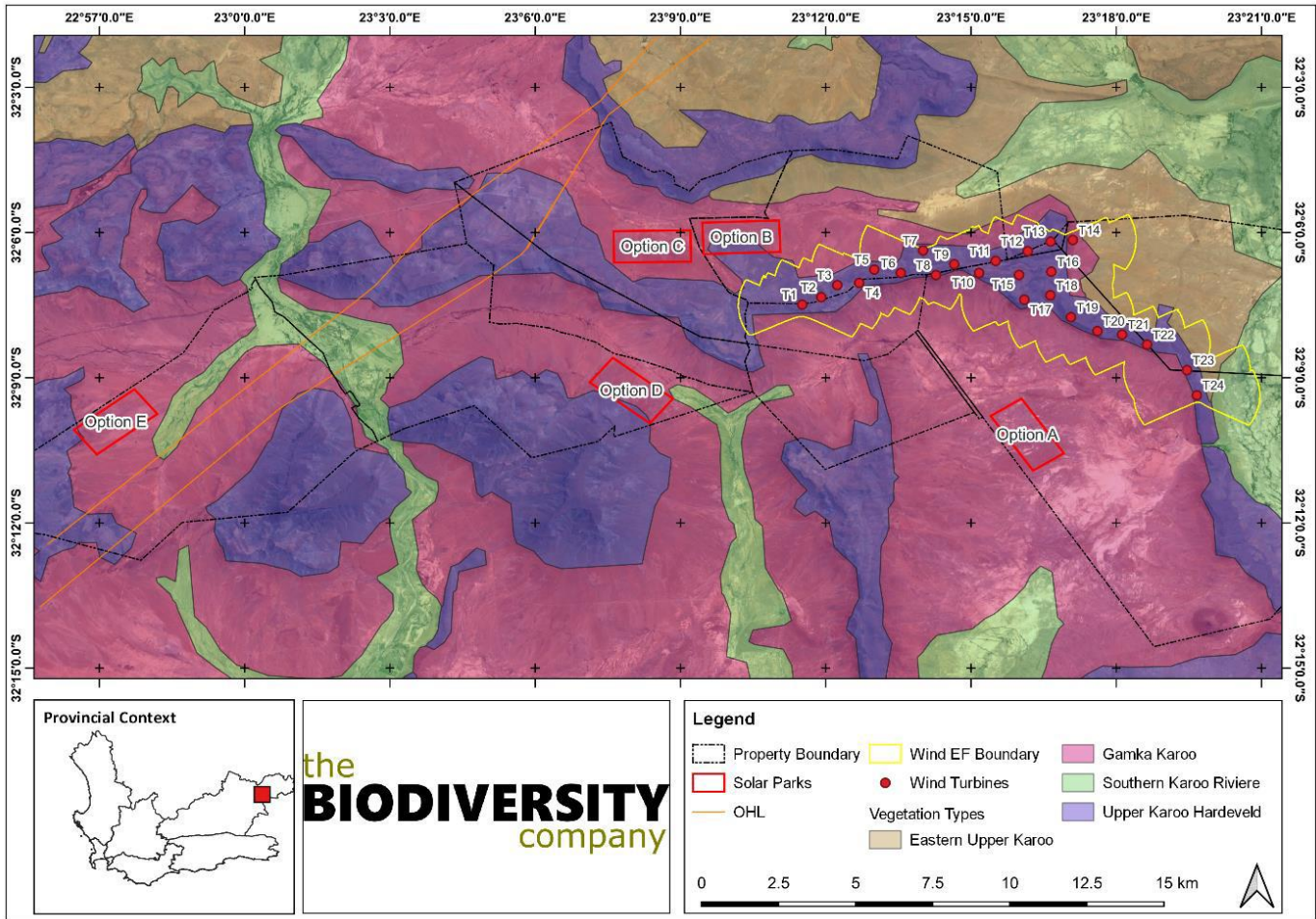


Figure 6.8: Map illustrating the vegetation type associated with the project area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland (Map reference: The Biodiversity Company, 2021. Poortjie Wes Renewable Energy Facilities – Screening Survey)

i) Protected and Conservation Areas

According to the protected area spatial datasets from SAPAD (2019), the proposed development does not occur within any protected area (Figure 3-3). The Karoo Nature Reserve is located approximately 35 km to the west and the Steenbokkies Private Nature Reserve is located approximately 23 km to the south-west of the project area. This indicates that the project area is located external to the 5 km buffer required to maintain provincial nature reserves and the 10 km required to maintain national parks.

The project area is not located within any focus area for the National Protected Area Expansion Strategy (NPAES) nor is there one within the proximal adjacent landscape (Figure 6.9).

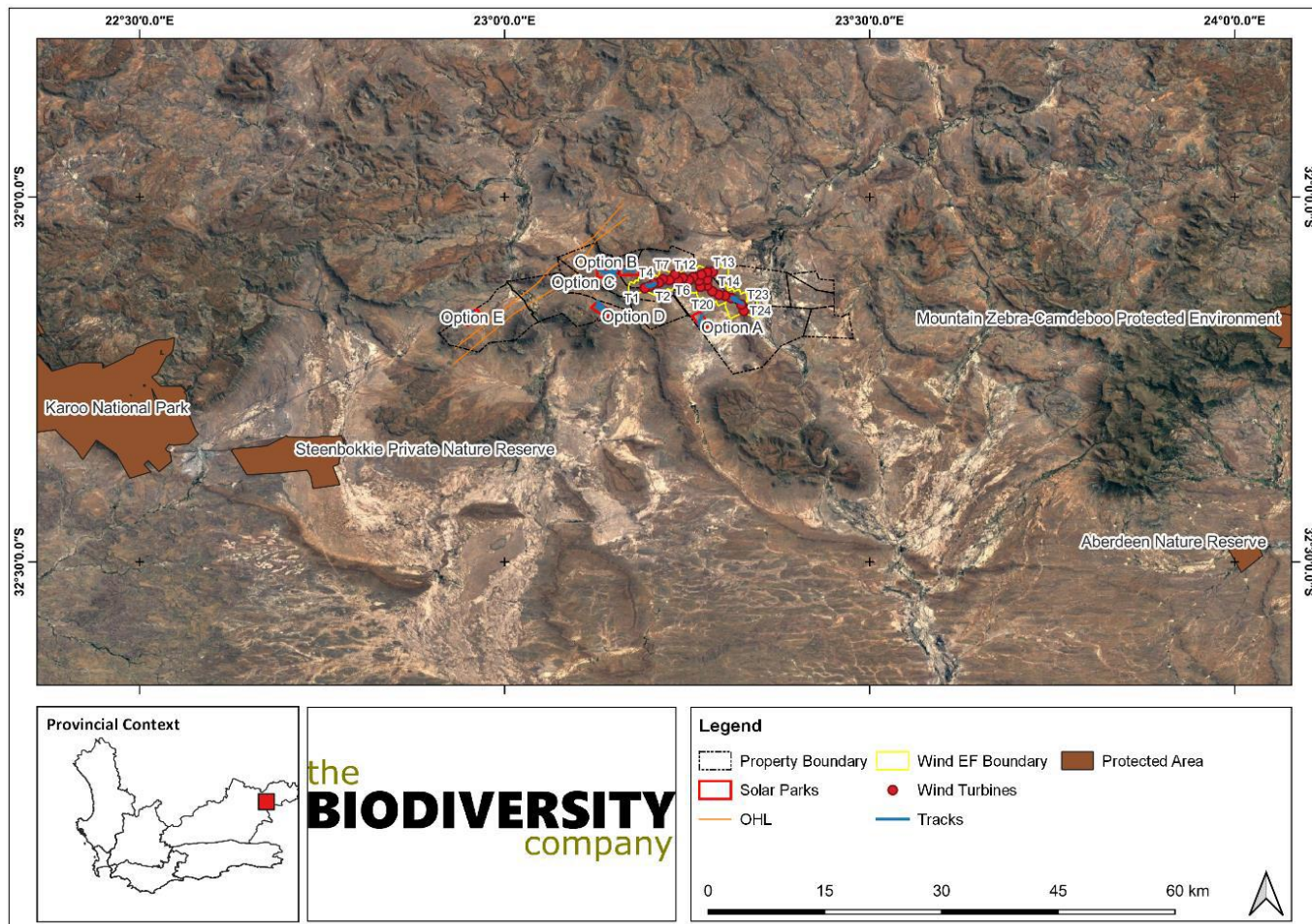


Figure 6.9: Map illustrating the location of protected areas proximal to the Poortjie Wes Renewable Energy Facilities project area (Map reference: The Biodiversity Company, 2021. Poortjie Wes Renewable Energy Facilities – Screening Survey)

ii) Ecosystem Threat Status and Protection Level

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function, or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the

spatial dataset the project area overlaps LC ecosystems (Figure 6.10).

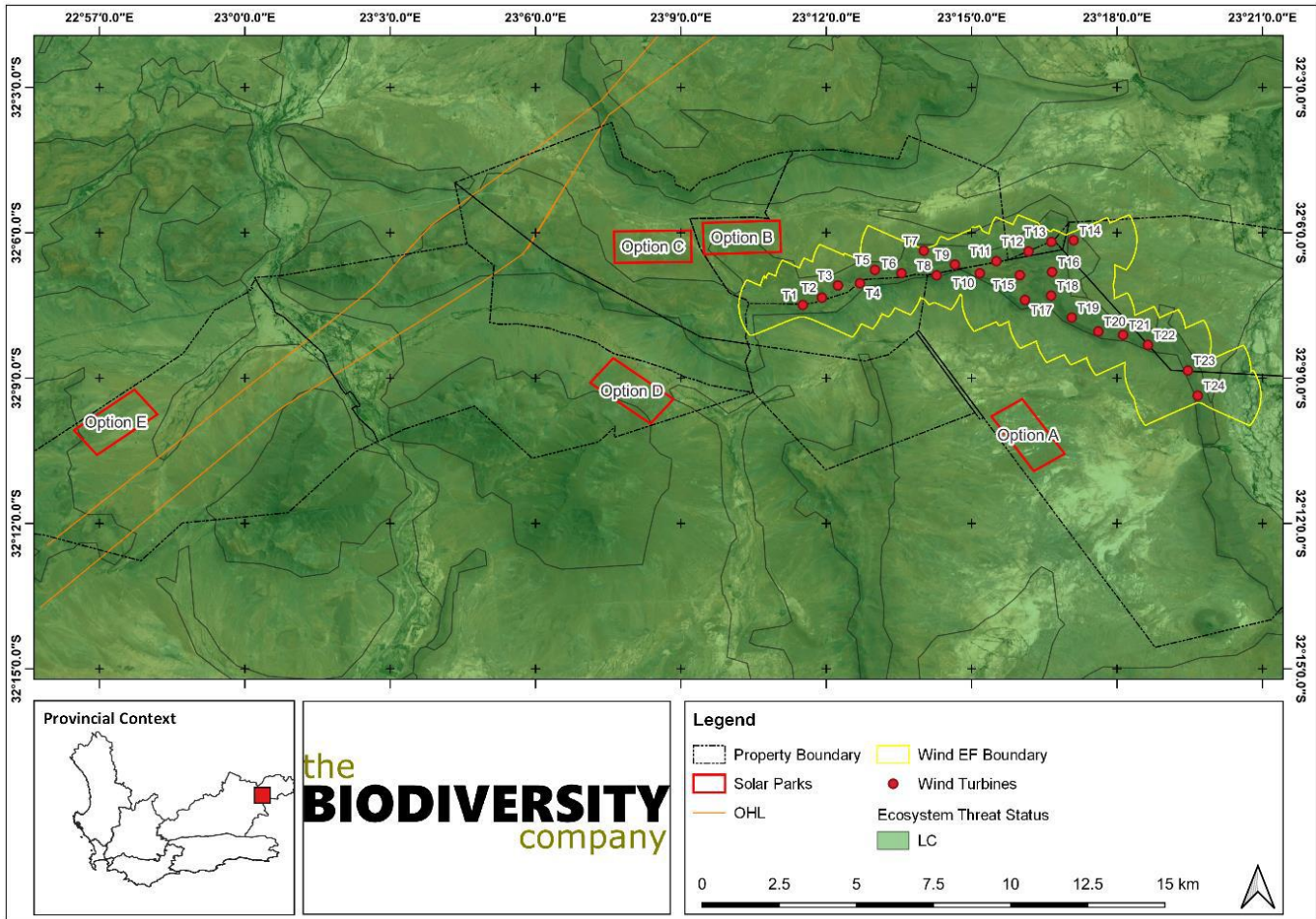


Figure 6.10 Map illustrating the ecosystem threat status associated with the Poortjie Wes Renewable Energy Facilities project area (Map reference: The Biodiversity Company, 2021. Poortjie Wes Renewable Energy Facilities – Screening Survey)

iii) Critical Biodiversity Areas

Conservation of Critical Biodiversity Areas (“CBAs”) is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017). The regional BSP data indicates that the project area overlaps with CBAs, Ecological Support Areas (“ESAs”) and Other Natural Areas (“ONAs”) (Figure 6.11).

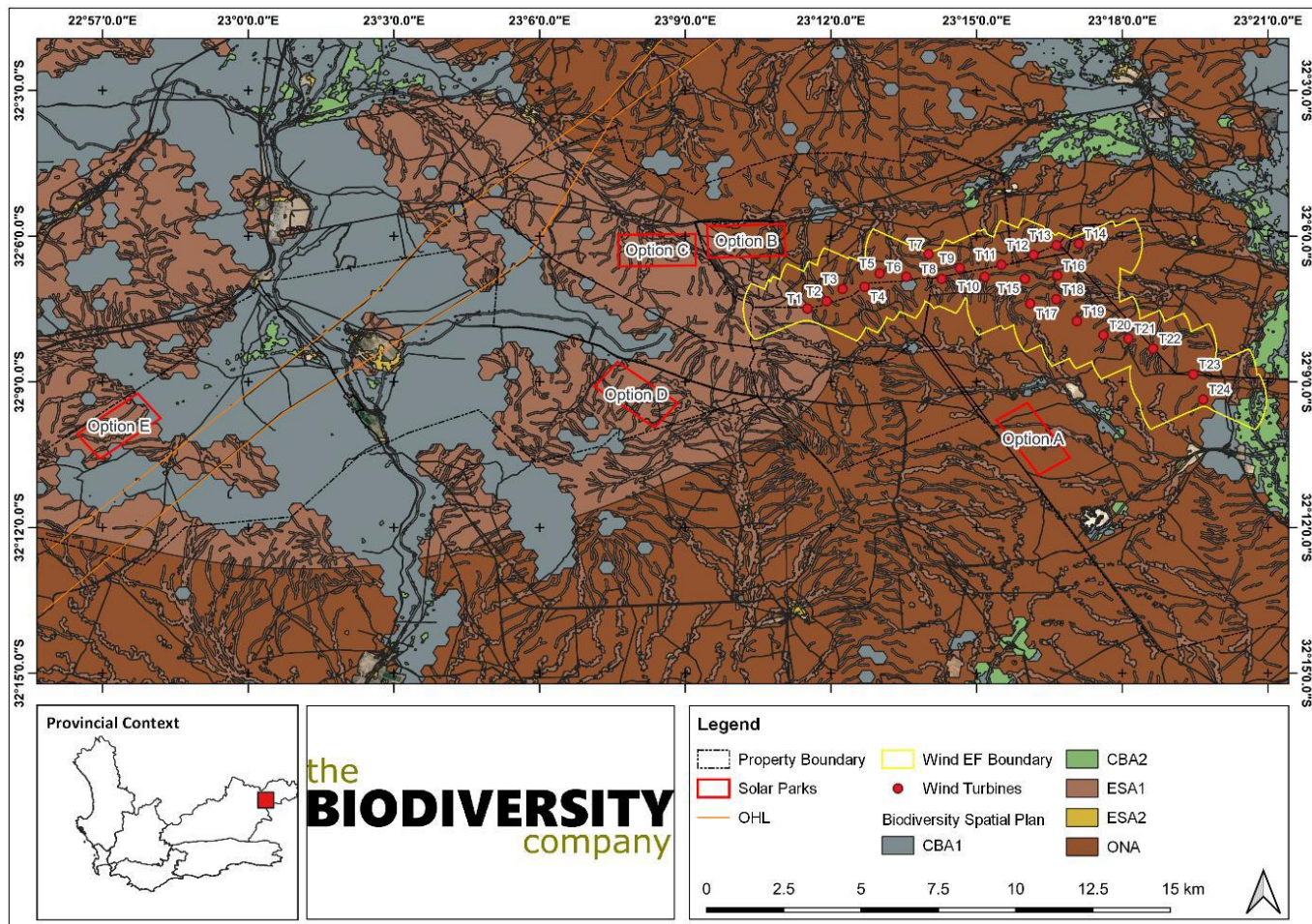


Figure 6.11: Map illustrating the Brakpan 1 SEF within ONA in terms of the Western Cape CBA data (Map reference: The Biodiversity Company, 2021. Poortjie Wes Renewable Energy Facilities – Screening Survey)

The features that each development footprint overlaps are provided in Table 6.6. The development footprints predominantly overlap ESA1 areas, ESA2 areas and ONAs, and only marginally overlap CBA1 features. These areas are regarded as ESAs, and ONAs as they are vital for watercourse protection and maintaining shale gas reserves. In addition, Solar Park Option E overlaps a CBA1 that is required for supporting a threatened vertebrate, however, the overlap is only marginal.

Table 6.6 Summary of the Western Cape Biodiversity Spatial Plan features overlapping the Poortjie Wes Renewable Energy Facilities proposed developments and the reason for their category

Proposed Development	Overlapping Category	Reasons
Solar Park Option A	ESA1 ONA	Watercourse Protection – Drought Corridor Gamka Karoo Vegetation Type
Solar Park Option B	ESA1 ONA	Watercourse Protection – Drought Corridor Shale Gas SEA Upper Karoo Hardeveld Vegetation Type Gamka Karoo Vegetation Type

Solar Park Option C	ESA1 ESA2	Watercourse Protection – Drought Corridor Ephemeral Upper Foothill River Shale Gas SEA Gamka Karoo Vegetation Type
Solar Park Option D	ESA1 ESA2	Watercourse Protection – Drought Corridor/Great Karoo Shale Gas SEA Upper Karoo Hardeveld Vegetation Type Gamka Karoo Vegetation Type
Solar Park Option E	CBA1 ESA1	Watercourse Protection – Great Karoo Shale Gas SEA Upper Karoo Hardeveld Vegetation Type Gamka Karoo Vegetation Type Threatened Vertebrate

iv) Expected Flora and Fauna Species of Conservation Concern

Based on the POSA database and the Environmental Screening Tool five threatened floral species are expected to occur within the project area (Table 6.7).

Table 6.7 Threatened flora species that are expected to occur within the Poortjie Wes Renewable Energy Facilities project area. VU = Vulnerable

Family	Species Name	Conservation Status	Endemism	Habitat	Likelihood of Occurrence
Aizoaceae	<i>Hereroa concava</i>	VU	Endemic	Plants occur sheltered among shrubs on flats and plateaus with shale outcrops.	High
Aizoaceae	<i>Peersia frithii</i>	VU	Endemic	Slopes or flats of finely weathered Ecca shales.	Low-Moderate
Apocynaceae	<i>Tridentea virescens</i>	Rare		Stony ground, or hard loam in floodplains.	Low
Bruniaceae	<i>Audouinia esterhuyseniae</i>	VU	Endemic	Shale soil on south-facing slopes below sandstone cliffs. A rare montane resprouter known from only two locations.	Low
Malvaceae	<i>Anisodontea malvastroides</i>	Rare	Endemic	It occurs in arid grassland on summit plateaus and escarpments. Locally abundant on cliffs or summit plateaus.	Moderate

Faunal Assessment

This section provides the list of threatened species expected to occur within the project area. N.B. the likelihood of occurrence that is provided refers to the development footprints and not the surrounding landscape.

3.1.3.1 Expected Amphibian Species of Conservation Concern

Based on the International Union for Conservation of Nature (IUCN) Red List Spatial Data and the FrogMAP database, six amphibian species are expected to occur within the area with none of these expected species regarded as threatened.

3.1.3.2 Expected Reptile Species of Conservation Concern

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 28 reptile species are expected to occur within the area with one of these species regarded as threatened.

Table 6.4 Reptile species of conservation concern that are expected to occur within the Poortjie Wes Renewable Energy Facilities project area. EN = Endangered and NT= Near Threatened

Family	Scientific Name	Common Name	Regional	Global	Likelihood of Occurrence
Testudinae	<i>Chersobius boulengeri</i>	Karoo Dwarf Tortoise	EN	EN	Moderate
Testudinae	<i>Psammobates tentorius tentorius</i>	Tent Tortoise	NT	NT	High
Family	Scientific Name	Common Name	Regional	Global	Likelihood of Occurrence
Gliridae	<i>Graphiurus ocellaris</i>	Spectacled Dormouse	NT	LC	High
Hyaenidae	<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT	High
Leporidae	<i>Bunolagus monticularis</i>	Riverine Rabbit	CR	CR	Low
Muridae	<i>Parotomys littledalei</i>	Littledale's Whistling Rat	NT	LC	High
Mustelidae	<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT	Low

Chersobius boulengeri (Karoo Dwarf Tortoise) is a South African endemic, occurring from Brintjieshoogte in the Eastern Cape to Touwsrivier in the Western Cape; the range in the Northern Cape extends north of Williston in the northwest and beyond Vosburg in the northeast. The species typically occupies dolerite ridges and rocky outcrops of the southern Succulent and Nama Karoo biomes at altitudes between 800 and 1 500 m above sea level (Hofmeyr *et al.*, 2018a). They usually take shelter under rocks in vegetated areas or in rock crevices, but few rocky sites over the range offer suitable retreats for the species. *Chersobius boulengeri* is a habitat specialist and population densities are low and are isolated on rocky outcrops with specialized

vegetation. There is no estimate of the global population, but surveys have indicated that many populations have disappeared, and population numbers have declined significantly (Hofmeyr *et al*, 2018a). In addition, the total population is severely fragmented. The principal threat is habitat degradation due to agricultural overgrazing and climate change. Shale gas exploration is an emerging serious threat.

Psammobates tentorius (Tent Tortoise) is restricted to South Africa and Namibia and of the three subspecies, *P. tentorius* occurs furthest to the south. The subspecies occurs in regions with winter, summer and all-year rainfall, and dwarf shrubland with succulents, annuals, grasses, and geophytes. Although the species is widespread, population density is generally low throughout its range, and populations appear to be declining slowly (Hofmeyr *et al*, 2018b). There is no estimate on the total global population. Threats include road mortality, veld fires, electrocution by livestock/game fences, and overgrazing from domestic livestock. Available information indicates that Pied Crow (*Corvus albus*) predation on this is increasingly severe, with anthropogenic facilitation of Pied Crow range expansion having led to increased predation rates (Hofmeyr *et al*, 2018b).

3.1.3.3 Expected Mammal Species of Conservation Concern

The IUCN Red List Spatial Data lists seven threatened mammal species that could be expected to occur within the project area (Table 6.8). This list excludes larger mammal species that are generally restricted to protected areas.

Table 6.8 Mammal species of conservation concern that are expected to occur within the Poortjie Wes Renewable Energy Facilities project area. CR = Critically Endangered, LC = Least Concern, NT= Near Threatened and VU = Vulnerable

Family	Scientific Name	Common Name	Regional	Global	Likelihood of Occurrence
Felidae	<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Low
Felidae	<i>Panthera pardus</i>	Leopard	VU	VU	Moderate
Family	Scientific Name	Common Name	Regional	Global	Likelihood of Occurrence
Gliridae	<i>Graphiurus ocellaris</i>	Spectacled Dormouse	NT	LC	High
Hyaenidae	<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT	High
Leporidae	<i>Bunolagus monticularis</i>	Riverine Rabbit	CR	CR	Low
Muridae	<i>Parotomys littledalei</i>	Littledale's Whistling Rat	NT	LC	High
Mustelidae	<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT	Low

Aonyx capensis (Cape Clawless Otter) is the most widely distributed otter species in Africa. This species is predominantly aquatic, and it is seldom found far from water. The main threat to the species is the declining state of freshwater ecosystems in Africa (Jacques *et al*, 2015). In parts of their range, they are killed for skins and other body parts, because they are regarded as competitors for food, particularly in rural areas where fishing is an important source of income, or where they are believed to be responsible for poultry losses, and damage to young maize plants.

Bunolagus monticularis (Riverine Rabbit) is endemic to the central Karoo region of South Africa. It is associated with the dense, discontinuous riparian vegetation fringing the seasonal rivers. It is dependent on soft and deep alluvial soils along the river courses for constructing stable breeding stops. Most of the Riverine Rabbit occupancy lies in the Upper Karoo Bioregion (approximately 80%), with about 12% in the Rainshadow Valley Karoo Bioregion, 4% in the Trans-Escarpment Succulent Karoo Bioregion, 3% in the in Western Fynbos-Renosterveld Bioregion and 1% in the Lower Karoo Bioregion. Many of the subpopulations are now extinct and the latest estimated Area of Occupancy is only 2 943 km² comprising 12 sub-populations (Collins *et al*, 2019). The total global population is estimated at 157-207 mature individuals with a continuing decline. Subpopulations are isolated from each other by jackal-proof fencing and severe land transformation through agricultural practices. All these subpopulations are estimated to contain less than 50 mature individuals (8–46 mature individuals, based on independent sightings in each river system). Sub-populations face significant threats from ongoing habitat degradation and fragmentation due to land-use practices, such as livestock farming and new emerging habitat-transforming land uses, such as climate change and energy development (Collins *et al*, 2019). Reduction in streamflow due to the construction of impoundments has presumably also reduced habitat quality. Although the species has been assigned a 'low' likelihood of occurrence for the development footprints, there are records within the broader landscape, as well as suitable habitat in the surrounding areas.

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and, is nocturnal. These factors have contributed to a lack of information on this species. The estimated number of mature individuals is 9 707, with the population exhibiting a continuing decline (Sliwa *et al*, 2016). The principle long-term threat for the species is the loss of key resources, such as den sites and prey, from anthropogenic disturbance or habitat degradation (Sliwa *et al*, 2016). An additional threat is indirect persecution, such as accidental poisonings (for example locust spraying, predator control lures/baits) and general predator persecution throughout most of their range. The long-term effects of climate change should not be overlooked and may lead to changes in range, changes in the timing of breeding events, increases in severe weather such as flooding and droughts, as well as increased disease patterns or risks of the spread of pathogens from parasites.

Graphiurus ocellatus (Spectacled Dormouse) is endemic to South Africa, where it occurs widely in Northern Cape, Eastern Cape, and Western Cape provinces. The species is associated with the sandstone formations, which have many vertical and horizontal cracks and crevices that provide shelter and nesting sites. The current population size is not known, but the species is not regarded as common densities ranging between 1.8 and 3.1 individuals/ha (Wilson *et al*, 2016). While the reporting frequency has been stable over the 10 years (1.2 ± 0.4 records / year) since 2005, it is 53% lower on average (2.5 ± 1.9 records / year) than the 10-year reporting frequency for the previous national assessment. Threats include ongoing habitat loss and habitat

fragmentation, because of plantations and vineyards, which may impact immigration and gene flow between isolated habitats Wilson *et al*, 2016). In addition, climate change may further shrink its range southwards.

Panthera pardus (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (Stein *et al*, 2020). There are few reliable data on changes in the status (distribution or abundance) throughout Africa over the last three generations, although there is compelling evidence that subpopulations have likely declined considerably. Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (Stein *et al*, 2020).

Parotomys littledalei (Littledale's Whistling Rat) is restricted to the arid areas of southern Africa, that is western South Africa and, Namibia and has a patchy distribution, linked to the distribution of deep sandy soils. This diurnal species occurs in shrubland and is dependent on ground cover, avoiding open habitats (Schradin *et al*, 2016). It is not known if the species can persist in disturbed or modified habitats, but it does occur in rangelands. The species is dependent on plant leaves and succulents as food and cannot switch to seeds or other resources. Burrows are constructed below bushes and linked together through surface pathways that also link to foraging areas and contain several nest chambers. It is relatively common in suitable habitat but undergoes population irruptions in response to environmental conditions. Prolonged droughts therefore will have a substantial negative affect on population numbers as it will reduce foraging availability. The primary threats are loss of habitat from climate change and overgrazing by livestock (Schradin *et al*, 2016).

Parahyaena brunnea (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall of less than 100 mm, particularly along the coast, semi-desert, open scrub, and, open woodland savanna. The total population size has been estimated between 5 000-8 000 individuals with a continuing decline in mature individuals (Wiesel, 2015). Outside protected areas, the Brown Hyaena may come into conflict with humans, and they are often shot, poisoned, trapped, and hunted by dogs in predator eradication or control programmes, or inadvertently killed in non-selective control programs (Wiesel, 2015). The species is regarded as a threat to livestock in some areas, despite the finding that they very seldom prey on livestock. Their body parts are also used in traditional medicine.

6.11 Heritage Resources, including archaeology and palaeontology

6.11.1 Archaeology and the Built Environment

Very few heritage assessments have been completed within close proximity to the area proposed for development (**Figure 6.12**). According to Nilssen (2014, SAHRIS NID 504763), "The Karoo houses a long and rich archaeological record dating from the earliest stages of Stone Age technology that are over a million years old, to the historic period that consists of the last few hundred years of human occupation (see Nilssen 2011 and references therein). Archaeological sites include caves and rock shelters, open-air artefact scatters, rock engravings, and historic structures with their associated cultural materials." According to ACO (2013, SAHRIS NID 503074), "Because of the scarcity of caves and shelters, more than 90% of Karoo archaeological sites are

open sites of stone artefacts, ostrich eggshell fragments and occasionally, pottery. Bone remains are rarely preserved. Artefacts of both the Early and Middle Stone Age are widespread and may generally be described as an ancient litter that occurs at a low frequency across the landscape. Where definable scatters of Early and Middle Stone Age material occur, they are significant heritage sites.

More intensive occupation of the Karoo started around 13 000 years ago during the Later Stone Age, which is essentially the heritage of Khoisan groups who lived throughout the region. The legacy of the San includes numerous open sites while traces of their presence can also be found in most large rock shelters, often in the form of rock art. They frequently settled a short distance from permanent water sources (springs or waterholes) and made use of natural shelters such as rock outcrops or large boulders or even large bushes. In the Great Karoo, natural elevated features such as dolerite dykes and ridges played a significant role in San settlement patterns" and as such, this broader area is renowned for its well-preserved rock art and other artefacts from this time, including rock engravings and rock gongs.

There are currently 14 identified sites of archaeological interest with over 400 examples of rock engravings (petroglyphs) in the immediate Nelspoort area of the Klipkraal farm. All engravings are made on the flat surfaces of the dolerite rocks, with the dark outer layer scraped away leaving the image expressed in the lighter sub-layer of the rock.

While the precise authorship of rock art is debated (Smith, Ouzman 2004), engravings fall broadly into three types described as follows:

- » |xam San hunter-gatherer rock engravings: representations include elephant, giraffe, hartebeest, jackal, zebra, and rhinoceros. Images also of human figures, bird-human figures and, spirit world representations.
- » Khoe herder geometric engravings: patterns such as lines radiating sun-like from a centre point, zig-zag patterns, and concentric circles.
- » Settler engravings: these include text, symbols, and direction markers such as arrows and images including a windpump and animals.

In many sites these different types of rock art co-exist, along with other evidence of habitation over an extended period, such as stone tools, grinding patches on stones, arranged stones, and rock gongs (Ouzman 2003). Nelspoort is the site of several rock gong complexes. The rock gong, or lithophone percussion instrument, is formed by dolerite boulders, some cracked as a result of a lightning strike or extreme temperature fluctuation, balanced on each other so that they resonate with a deep ringing sound when struck in a specific way. They are believed to have been intrinsic to spiritual practices of the |xam San people. Two rock gong groupings are located on small rises across the shallow Nelspoort valley, suggesting that the gong's sound may have been used for communication purposes (Rusch 2016).

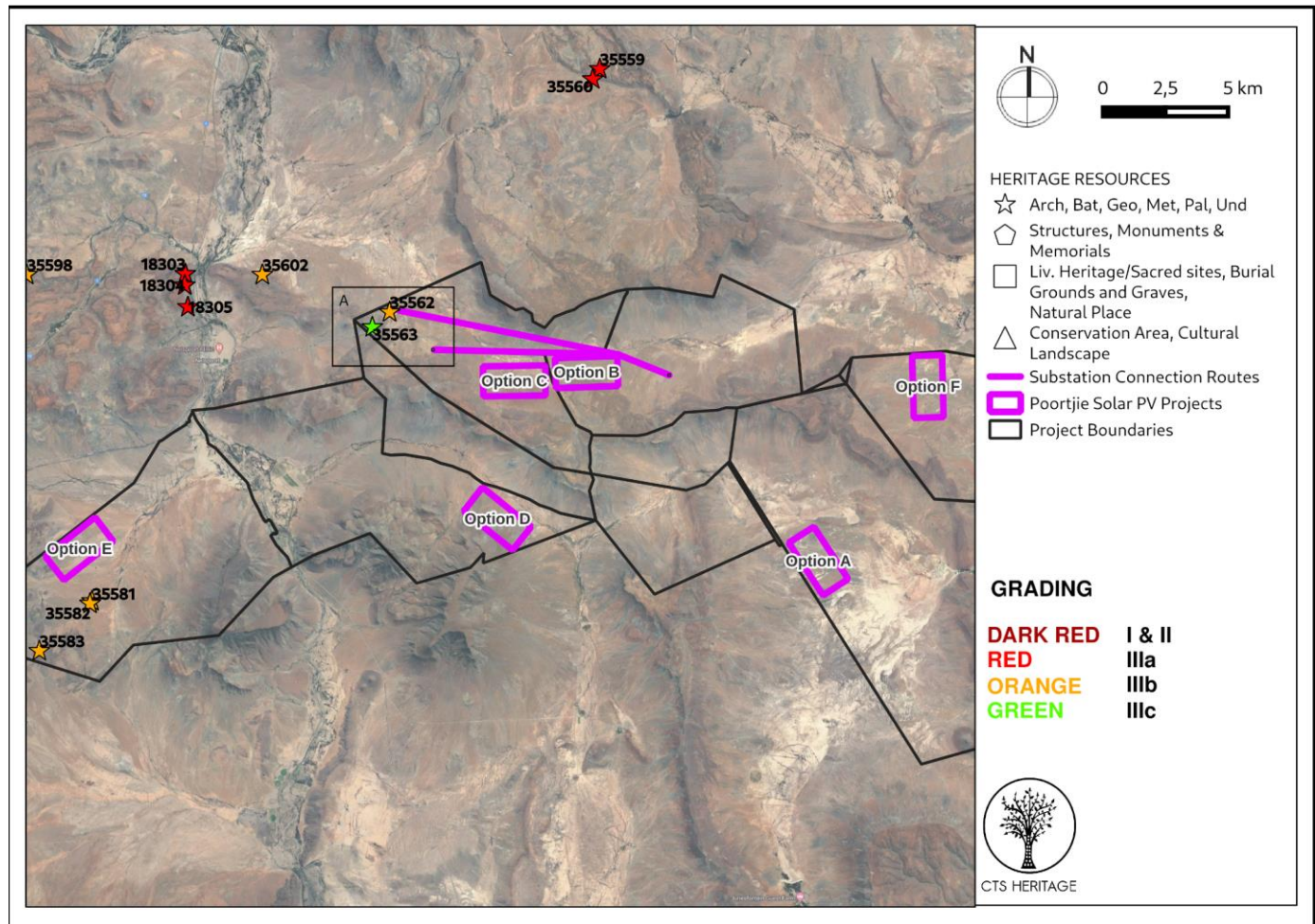


Figure 6.12: Map illustrating the heritage sites identified within the entire study area and development area of the Brakpan 1 SEF. (Map reference: CTS Heritage, 2022. Poortjie Wes Renewable Energy Facilities – Heritage Impact Study)

6.11.2 Palaeontology

According to the SAHRIS Palaeosensitivity Map (**Figure 6.13**), the area proposed for development is underlain by sediments of very high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3122 for Victoria West, the development area is underlain by the Abrahamskraal and Teekloof Formations, both of the Adelaide Subgroup of the Beaufort Group of sediments. According to the SAHRIS Fossil Heritage Browser and the Palaeotechnic Report for the Western Cape (Almond and Pether, 2008), the Beaufort Group sediments are known to preserve diverse terrestrial and freshwater tetrapods of *Tapinocephalus* to *Lystrosaurus* Biozones (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways) and sparse vascular plants (*Glossopteris* Flora, including petrified wood). Based on the known paleontological sensitivity of this area, it is very likely that activities associated with the development of the proposed PV and grid connections will negatively impact on significant fossil heritage.

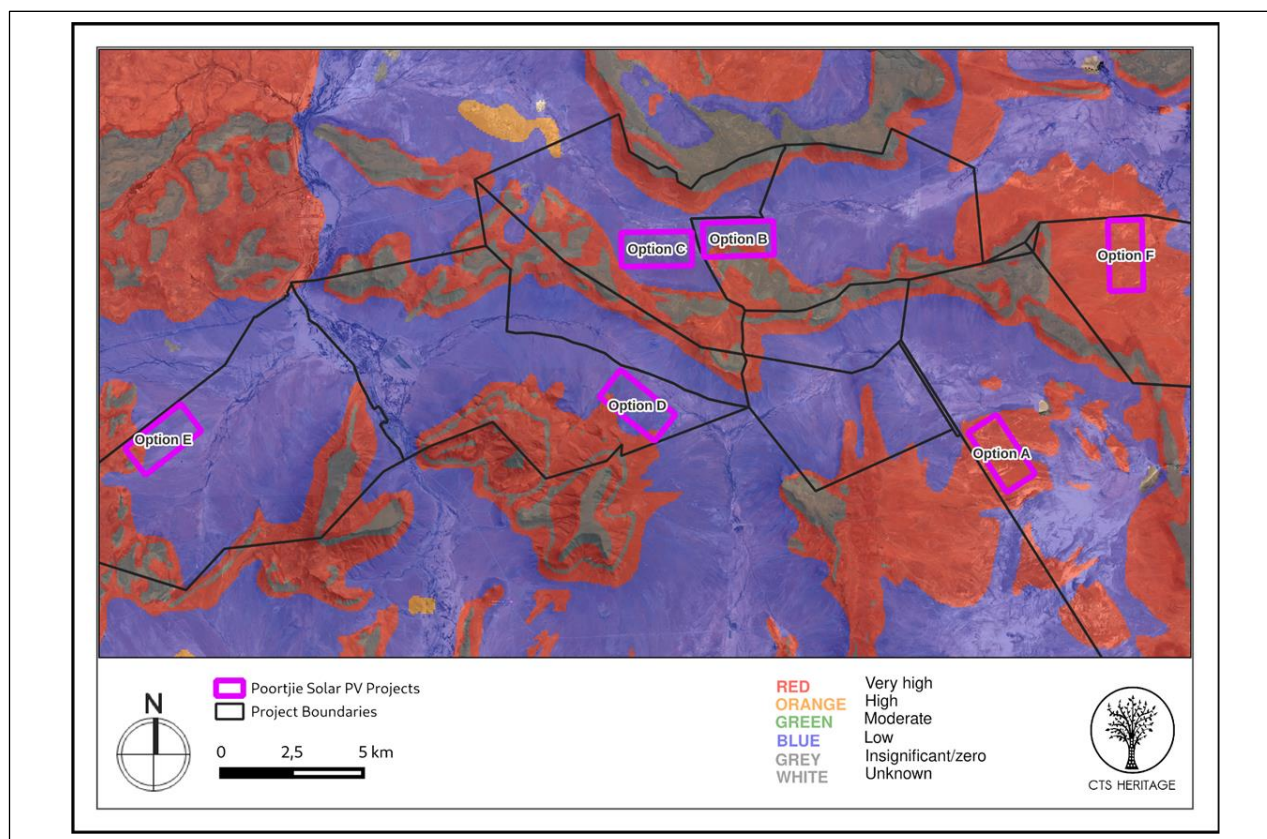


Figure 6.13: A Palaeosensitivity map of the entire study area and development area of the Brakpan 1 SEF (Map reference: CTS Heritage, 2022. Poortjie Wes Renewable Energy Facilities – Heritage Impact Study)

6.12 Visual Quality

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

A visual 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.

In general, the landscape character of the greater study area and the site itself presents as undeveloped and largely natural. The visual quality of the region is generally high by virtue of the vast and undeveloped nature of the environment. This lends a distinct sense of place to the area, but the landscape is not unique. As such, the entire study area is considered sensitive to visual impacts due to its generally low levels of transformation.

The results of visual exposure, viewer incidence / perception and visual distance of the proposed facility are displayed on **Figure 6.14**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index. An area with short distance, a high viewer incidence

and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact when evaluating the issues related to the visual impact. The visual impact index for the proposed facility is further described as follows.

- » The visual impact index map indicates a core zone of high visual impact within 1km of the proposed facility. There are no identified sensitive visual receptors within this core area.
- » Visual impact is predominantly moderate between 1km and 3km of the proposed facility. There are no identified sensitive visual receptors within this core area.
- » Visual impact is prominently low between 3 km and 6 km of the proposed facility. The identified receptors between 3km and 6km of the proposed facility, as listed below, are likely to experience moderate visual impact, should no mitigation be undertaken. Sensitive visual receptors within this zone comprise mainly the following users: Residents of Drinkwaterkloof, Hillside, and Poortjie Wes.
- » Beyond the 6 km of the proposed facility, the extent of potential visual impact is greatly reduced, and the magnitude is predominantly very low to negligible. It is not expected that sensitive receptors, if any, will be impacted visually by the proposed facility.

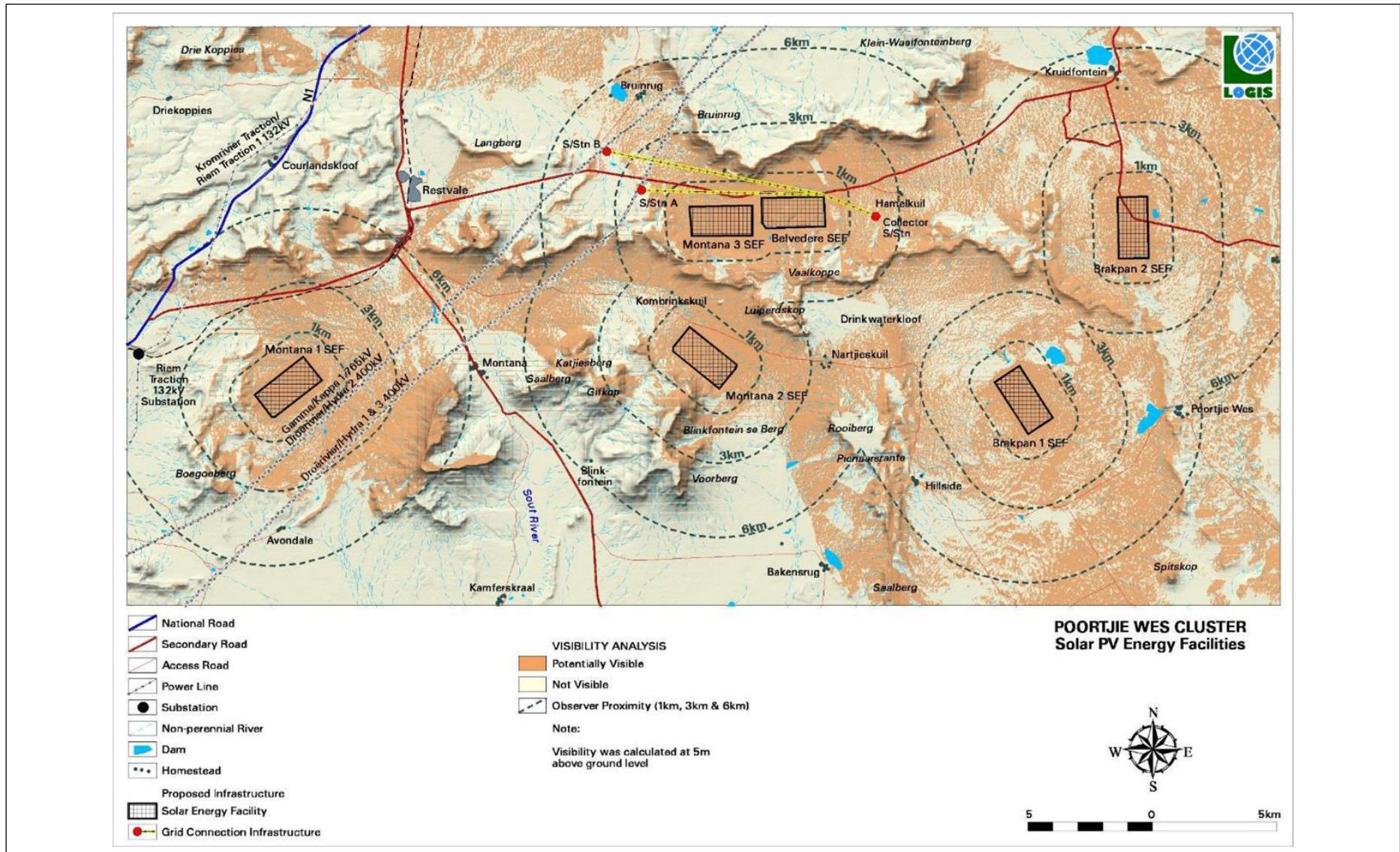


Figure 6.14: Potential visual exposure (viewshed analysis) of the proposed the Brakpan 1 SEF (LOGIS & Nuleaf Planning and Environmental (Pty) Ltd., 2022)

6.13 Social Profile

The social profile indicates the specific social aspects within the area which will be relevant to the development of the Brakpan 1 SEF, and which may be affected by the development of the proposed project.

Table 6.9 provides a baseline summary of the socio-economic profile of the Beaufort West Local Municipality within which the Brakpan 1 SEF is proposed. To provide context against which the Local Municipality's socio-economic profile can be compared, the socio-economic profiles of the Great Karoo District, Western Cape Province, and South Africa as a whole have also been provided where applicable. The data presented in this section have been derived from the 2011 Census, the Western Cape Provincial Spatial Development Framework (PSDF), and the Great Karoo DM and Beaufort West LM IDPs.

Table 6.9: Baseline description of the socio-economic characteristics of the area within which the Brakpan 1 SEF is located

Location characteristics
<ul style="list-style-type: none"> » The project is proposed within the Western Cape Province, located in the southwestern corner of South Africa. » The project is proposed within the Beaufort West LM of the Central Karoo DM. » The Beaufort West LM is approximately 21 917 km² in extent.
Population characteristics
<ul style="list-style-type: none"> » The Beaufort West municipal area currently (2020) has a population of 51 074. » The data indicates that there are notably more females than males in the Beaufort West municipal area with a ratio of 53,1 per cent (females) to 46,9 per cent (males). The SR for Beaufort West increases slightly from 2020 to 2021, whereafter it is expected to remain unchanged » In 2020, the Beaufort West Local Municipality had the lowest average annual growth rate of 1.14% relative to the others within the Central Karoo District Municipality. » This total is expected to decrease to 50 904 by 2024, equating to an average annual growth rate of -0.1 per cent. In comparison, Prince Albert and Laingsburg municipal areas will both grow at 0.7 per cent across the same period. The gender population has also increased with 24% in the male population and a 2.7% increase in the female population. » According to Census 2011, the population of 51 074 are comprised of 16,3% black African, 73,5% coloured people, 9,2% white people, with the other population groups making up the remaining 0,5% » The main languages spoken in this municipal area are Afrikaans (80%) and isiXhosa (10%) » The age pyramid indicated that the population of Beaufort West is predominately young people.
Economic, education and household characteristics
<ul style="list-style-type: none"> » There are 14 784 economically active (employed or unemployed but looking for work) people in the municipality, and of these 25,5% are unemployed. » Of the 6 969 economically active youth (aged 15 – 34) in the municipality, 34,5% are unemployed. » In terms of the percentage of people living in poverty for each of the regions within the Central Karoo District Municipality, Beaufort West Local Municipality has the highest percentage of people living in poverty, using the upper poverty line definition, with a total of 50.6%. » There are 13 089 households in the municipality, with an average household size of 3,6 persons per household. » Of those aged 20 years and older, 7,5% have completed primary school, 34,6% have some secondary education, 23,7% have completed matric and 6,5% have some form of higher education. Of those aged 20 years and older 10,2% have no form of schooling. » In 2017, the Beaufort West municipal area had a total of 20 public ordinary schools. This number has decreased to 19 in 2018 and 18 in 2019. The closure of schools in Beaufort West can impact negatively on education outcomes given the gradual increase in learner enrolment. » Agriculture, forestry & fishing are the biggest contributor of all industry to the GDP.
Services

- » In terms of the HDI for each of the regions within the Central Karoo District Municipality, Laingsburg Local Municipality has the highest HDI, with an index value of 0.679. The lowest can be observed in the Beaufort West Local Municipality with an index value of 0.67.
- » With a total of 13 691 households in the Beaufort West municipal area, 97.9 per cent had access to formal housing, which is the highest in the entire Province. In fact, only 1.3 per cent of all households resided in informal dwellings in 2019. The CKD informal household average for 2019 was 1.9 per cent.
- » The region within Central Karoo with the highest number of households with electricity for lighting and other purposes is Beaufort West Local Municipality with 13 800 or a share of 69.83% of the households with electricity for lighting and other purposes within Central Karoo District Municipality.
- » Almost 97,4% of households have access to piped water either in their dwelling or in the yard. Only 0,6% of households do not have access to piped water, and 92,0% of households have access to electricity for lighting.
- » The number of households receiving free basic water and sanitation services in the municipal area gradually increased since 2015 as the drought intensified.
- » The number of households receiving free electricity has also increased across the reference period while refuse removal services fluctuate considerably. It is important to note that households must register to be eligible for free basic services. The total number of indigent households to receive services free of charge does therefore vary on an annual basis.

CHAPTER 7: 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 Brakpan 1 Solar Energy Facility and its associated infrastructure. This assessment has considered the construction of a PV facility with a contracted capacity of up to 220MW, within a development area of 450ha in extent. Brakpan 1 Solar Energy Facility will comprise the following key infrastructure and components:

- (10) Solar Facility
 - » PV modules (mono or bifacial);
 - » Single or dual axis tracking structures, Fixed Axis Tracking, or Fixed Panels;
 - » Fixed tilt mounting structure (to be considered during the design phase of the facility);
 - » Galvanised steel and/or aluminium solar module mounting structures;
 - » Solar module substructure foundations. These will likely be drilled into the ground, filled with concrete, and then have posts fixed inside them. Alternately, ramming may be used; and
 - » 60 to 65 Central Inverter stations.

- (11) Building Infrastructure
 - » Offices;
 - » Operational and maintenance control centre;
 - » Warehouse/workshop;
 - » Panel maintenance and cleaning area;
 - » Ablution facilities;
 - » A conservancy tank for storage of sewage underground with a capacity of up to 35m³; and
 - » Guard Houses.

- (12) Associated Infrastructure
 - » On-site substation building - IPP owned (including lightning conductor poles);
 - » Eskom switching station, to be handed over to Eskom at Commercial Operation Date ("COD") (this forms part of a separate BA);
 - » Battery storage (500MW/500MWh);
 - » Internal distribution lines of up to 33 kV;
 - » Underground low voltage cables or cable trays;
 - » Internal gravel roads;
 - » Fencing;
 - » Stormwater channels;
 - » Temporary work area during the construction phase; and an
 - » Access road to site from the existing Minor Road OP9212, off the District gravel road between Nelspoort and Murraysburg No. MR 587.

A development area of (~450ha) was considered for the Brakpan 1 Solar Energy Facility. As detailed in Chapter 2, the identification of a development area for the solar facility within the project site was undertaken by the developer through consideration of the sensitive environmental features and areas and the application of a mitigation hierarchy that aimed at avoidance as the first level of mitigation. A layout

within the development area was proposed by the developer and is assessed in this BA Report (refer to **Figure 7.1**).

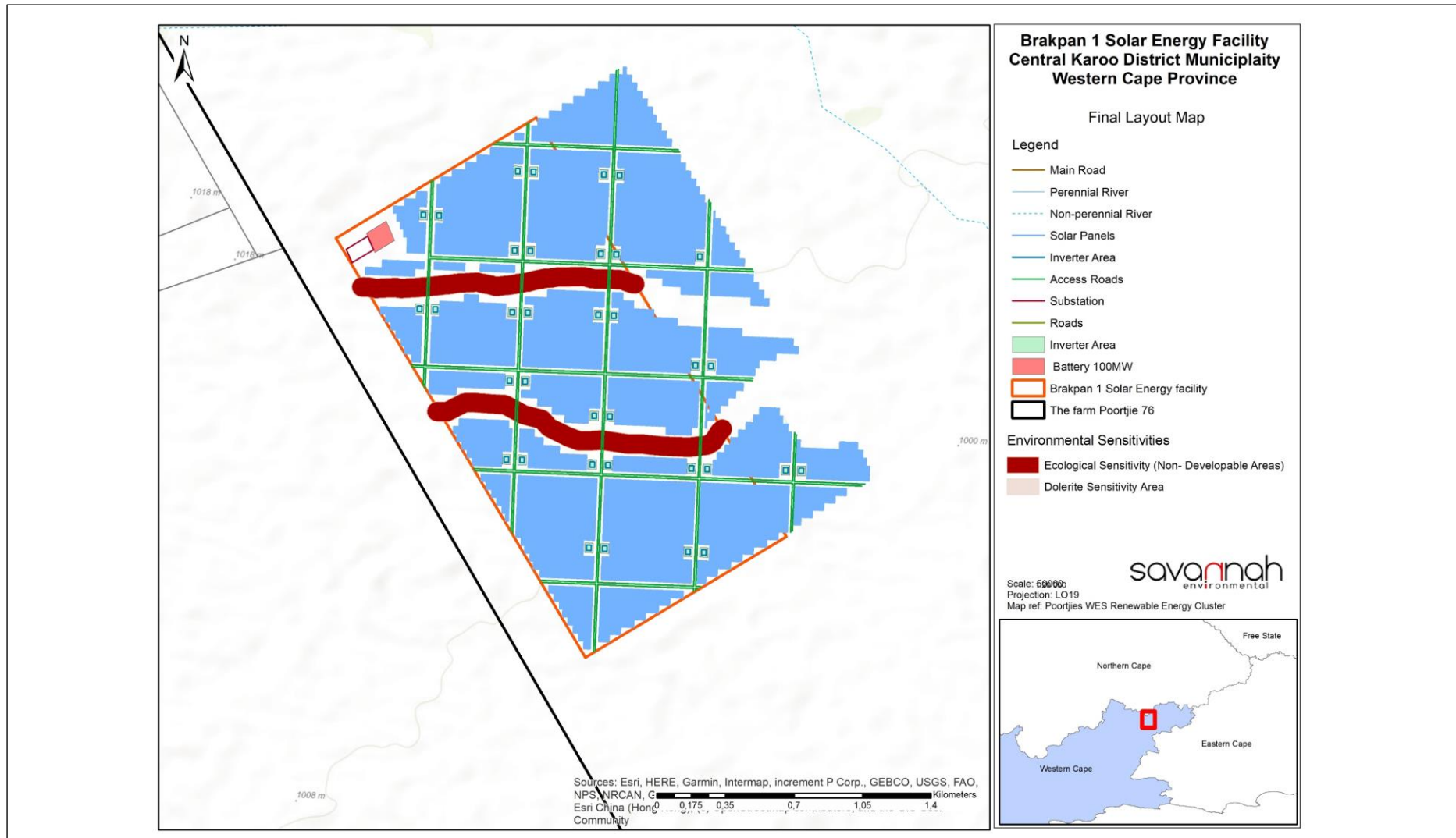


Figure 7.1: Map of Brakpan 1 Solar Energy Facility development area including associated infrastructure

The proposed development of Brakpan 1 Solar Energy Facility 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 the 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 Brakpan 1 Solar Energy facility is estimated at 12 – 18 months.
- » *Operation* – will include the operation of the PV facility and the generation of electricity, which will be fed into the national grid via the on-site substation and dedicated grid connection infrastructure (comprising a Collector Substation, a 132kV power line to connect to the Poortjie Wes 400/132kV LILO MTS ("Poortjie Wes LILO MTS") Substation and 400kV LILO power lines). The operation phase of the Brakpan 1 Solar Energy Facility is expected to be approximately 20 years (with maintenance).
- » *Decommissioning* – depending on the economic viability of the PV facility, the length of the operation phase may be extended beyond a 20-years. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the PV facility and its associated infrastructure, clearance of the relevant infrastructure at the PV panel area, and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities; however, in certain instances decommissioning impacts have been considered separately.

Environmental impacts associated with the pre-construction, construction (and decommissioning) of Brakpan 1 Solar Energy Facility 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. 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.

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
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 risks associated with the development of Brakpan 1 Solar Energy Facility 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 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3.
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	The positive and negative impacts associated with the development of the Brakpan 1 Solar Energy Facility are included in sections 7.3.2, 7.4.2, 7.5.2, 7.6.2, 7.7.2, and 7.8.2, 7.9.2 and 7.10.2.

Requirement	Relevant Section
on the geographical, physical, biological, social, economic, heritage, and cultural aspects	
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 Brakpan 1 Solar Energy Facility are included in sections 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3.
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 Brakpan 1 Solar Energy Facility 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 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3.
3(j) an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts, (ii) the nature, significance, and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.	An assessment of each impact associated with the development of Brakpan 1 Solar Energy Facility, 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 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3.
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 EMPr.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in sections 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3, and 7.10.3.

7.2. Quantification of Areas of Disturbance within the Development Area

To quantitatively assess the impacts associated with the development of the Brakpan 1 Solar Energy facility, it is necessary to consider the extent of the identified development area to be affected by the pre-construction and construction activities of the proposed solar PV facility. An area of 395ha is proposed for the placement of the PV facility and associated infrastructure. This equates to 87.78% of the larger project site.

7.3. Aspects determined through specialist investigation not requiring further assessment

From the specialist studies undertaken it was determined that soils and agricultural aspects did not require a detailed assessment. A Compliance Statement (refer to **Appendix F**) in this regard has been prepared in compliance with the relevant specialist protocols.

The most sensitive soil forms that can be expected for the area include the Hutton and Oakleaf soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low to Moderate" sensitivities, which correlates with the requirements for a compliance statement only.

The available climate can limit crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area. The area is not favourable for most cropping practices.

It is worth noting that, additional baseline soil field assessments can provide a better understanding of the soil or land potentials for the project area. It is the specialist's opinion that the proposed solar renewable energy project based on the DAFF (2017) land capability sensitivity of the area will have a limited impact on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed solar renewable energy project development may be favourably considered.

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

The development and operation of the Brakpan 1 Solar Energy Facility 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 detailed assessment is provided in the specialist report included in **Appendix D**.

7.4.1 Habitat Assessment and Species of Conservation Concern

The latest available landcover dataset indicates that the majority of the landscape within which the project area is located, is classified as Nama Karoo shrubland, with patches of open bare ground, natural grassland, open woodland and artificial waterbodies.

The project area is located within the Nama Karoo Biome, which is a large, landlocked region on the central plateau of the western half of South Africa and extends into south-eastern Namibia. This is an arid biome with the majority of the river systems being non-perennial. Apart from the Orange River and the few permanent streams in the southwest that originate in higher-rainfall neighbouring areas, the limited number of perennial streams that originate in the Nama-Karoo are restricted to the more mesic east. The low precipitation is unreliable (coefficient of variation of annual rainfall up to 40%) and droughts are unpredictable and prolonged. The unpredictable rainfall impedes the dominance of leaf succulents and is too dry in summer for dominance by perennial grasses alone, and the soils are generally too shallow, and the rainfall is too low for trees. Unlike other biomes of southern Africa, local endemism is very low and consequently, the Nama-Karoo Biome does not contain any centre of endemism. Despite relatively low floristic diversity, the Nama-Karoo vegetation has a high diversity of plant life forms. These include co-occurring ephemerals, annuals, geophytes, C3 and C4 grasses, succulents, deciduous and evergreen chamaephytes and trees. This is probably a consequence of an ecotonal and climatically unstable nature of the region.

Several species of flora protected under provincial legislation were recorded within the project area during the survey period, namely

- » Aizoaceae (*Ruschia intricata*)
- » Aizoaceae (*Ruschia spinosa*)
- » Aizoaceae (*Trichodiadema* sp).
- » Amaryllidaceae (*Ammocharis coranica*)
- » Hyacinthaceae (*Dipcadi* sp).

A permit from the relevant authority, Cape Nature, must be obtained in order to achieve this. It is further recommended that not only protected species be relocated but also succulent species of other taxonomic groups where it is feasible

7.4.2 Site Sensitivity

The Relative Plant Species Theme Sensitivity as indicated in the DFFE screening report was derived to be 'Medium' and the Relative Animal Species Theme Sensitivity was derived to be 'High' (**Figure 7.2**).





Figure 7.2: Relative Plant Species Theme Sensitivity (top) and Relative Animal Species Theme Sensitivity (bottom) for the proposed Brakpan 1 Solar Energy Facility development area

Based on the ecological study undertaken, all habitats within the development area were assigned a sensitivity category. The development area was categorised as having a high Site Ecological Importance (SEI) (refer to **Figure 7.3**). This indicates that the findings of this assessment correlate with the Screening Tool with respect to the Animal Species Theme sensitivity.

Area (ha)	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
297.168	Medium Confirmed or highly likely occurrence of populations of NT species	High Very large (> 100 ha) intact area for any conservation status of ecosystem type. High habitat connectivity serves as functional ecological corridors,	Medium	Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality.	High

Area (ha)	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
		limited road network between intact habitat patches.			

Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance (SEI)	Interpretation in relation to proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.

7.4.3 Description of Ecological Impacts

Potential impacts on fauna and flora anticipated to occur with the development of Brakpan 1 Solar Energy Facility include:

- » Destruction, fragmentation and degradation of habitats and ecosystems resulting from the physical removal of vegetation (if present), the construction of internal access roads, soils dust precipitation and random events such as fire.
- » Spread and/or establishment of alien and/or invasive species due to vegetation removal (if present), vehicles potentially spreading seeds, unsanitary conditions surrounding infrastructure and thus promoting the establishment of alien and/or invasive rodents and the establishment of infrastructure suitable for breeding activities of alien and/or invasive birds.
- » Direct mortality of fauna due to the clearing of vegetation (if present), vehicle collision, and chemical spills and the intentional killing of fauna for food resulting from unregulated/unsupervised outdoor activities.
- » Reduced dispersal/migration of fauna resulting from loss of landscape used as a corridor, compacted roads, and the removal of vegetation (if present).
- » Environmental pollution due to water runoff, spills from vehicles, machinery, and erosion.
- » Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution resulting from the operation of machinery and vehicles on site.

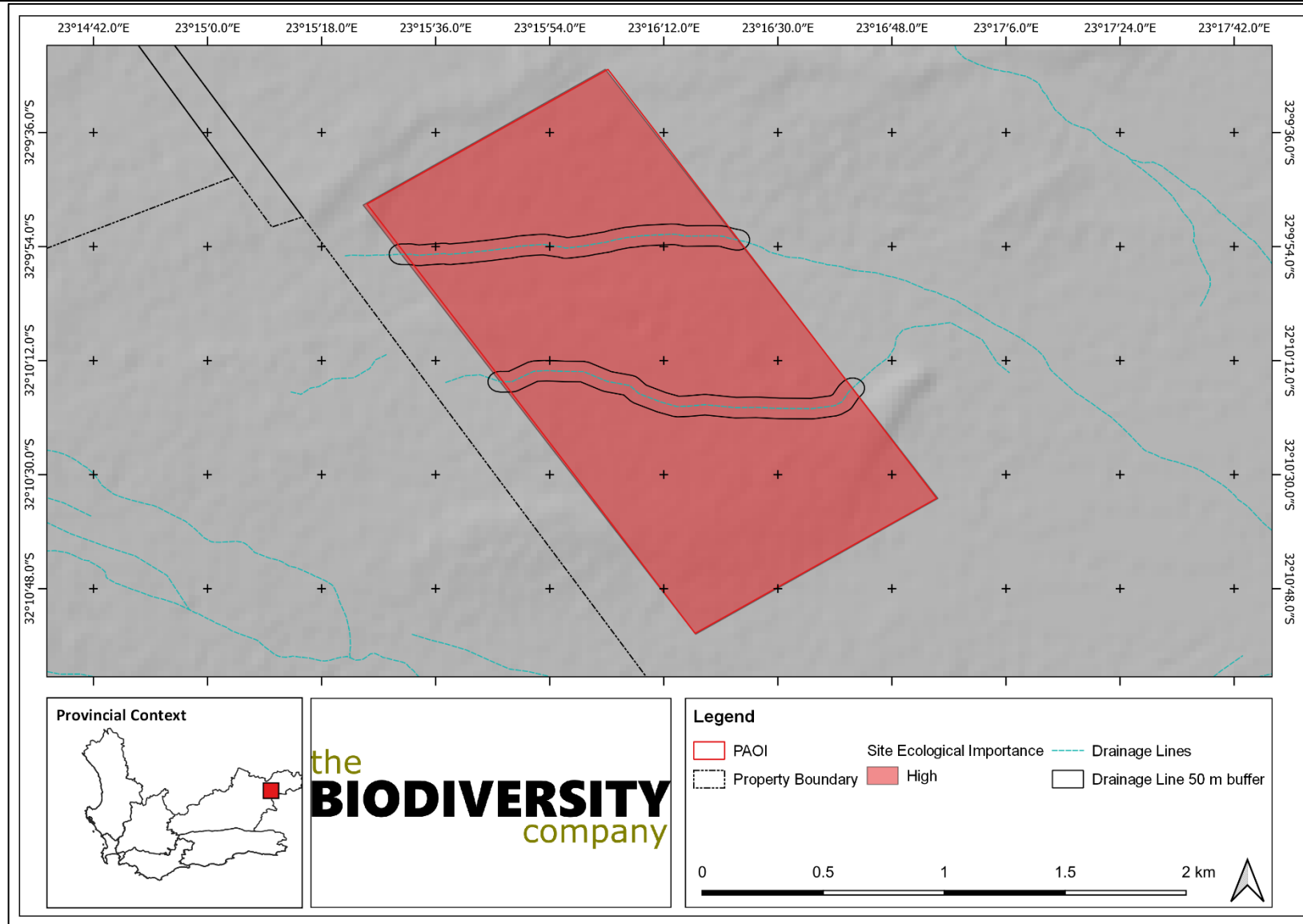



Figure 7.3: Map illustrating the Site Ecological Importance (SEI) of the habitats delineated within the Brakpan 1 Solar Energy Facility development area

7.4.4 Impact tables summarising the significance of impacts on ecology during construction, operation and decommissioning

Construction Phase Impacts

Impact Nature: Loss of habitat within the development footprint		
There will be a loss of natural vegetation and habitat due to the construction of the solar energy facility. This impact was considered for both the construction and operational phases.		
	Without mitigation	With mitigation
Extent	Low (2)	Low (2)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	High (80)	Medium (60)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, albeit to a limited extent.	
Mitigation:		
<ul style="list-style-type: none"> » Solar panels must be mounted on pile-driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both fossorial and epigeic biodiversity (Bennun et al, 2021). If concrete foundations are used that would increase the impact of the project as there would be direct impacts on soil permeability and characteristics, thereby influencing inhabitant fauna. In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas. » Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). The photographs below are sourced from these documents. 		
		
<ul style="list-style-type: none"> » Vegetation clearing to commence only after the necessary permits have been obtained. » Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities. » Riparian buffer zones must be avoided and not used as laydown and/or storage areas. 		
Residual Impacts:		
The loss of indigenous vegetation is an unavoidable consequence of the development and cannot be entirely mitigated. The residual impact would be moderate.		

Impact Nature: Degradation and loss of surrounding natural habitat		
Degradation and loss of surrounding natural vegetation arising from construction activities if these are allowed to penetrate into the surrounding area.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Very short term (1)

Magnitude	Moderate (6)	None (0)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (52)	Low (6)
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"> » Pre-construction environmental induction for all construction staff on-site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas, etc. » All construction activity and roads to be within the clearly defined and demarcated areas. » Temporary laydown areas should be clearly demarcated and rehabilitated subsequent to end of use. » Appropriate dust control measures to be implemented. If feasible, it is recommended that a wind fence be constructed to prevent excessive dust pollution. » Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act. » All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner. 		
Residual Impacts:		
It is unlikely that residual impacts are expected if the appropriate mitigation measures are implemented. However, there may still be minimal degradation due to dust precipitation.		

Impact Nature: Direct mortality of fauna		
Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (44)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation:		
<ul style="list-style-type: none"> » All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species. » Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate. » Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. » All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. » All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel, and oil spills that occur at the site should be cleaned up in the appropriate manner. » Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter. 		

Residual Impacts:

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

Impact Nature: Emigration of fauna due to noise pollution

Construction activity will likely lead to the emigration of fauna due to noise pollution.

	Without mitigation	With mitigation
Extent	Moderate (3)	Moderate (3)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (44)	Medium (36)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, but only to a limited extent. The mitigation of noise pollution during construction is difficult to mitigate against	

Mitigation:

» Considering that many of the mammal fauna recorded within the project area are nocturnal, no construction activity is to occur at night.

Residual Impacts:

It is probable that some individuals of susceptible species will emigrate due to the noise generated from the construction activity. However, this is not likely to impact the viability of the local population of any fauna species.

Operational Phase

Impact Nature: Loss of habitat within the development footprint

There will be a loss of natural vegetation and habitat due to the construction of the solar energy facility. This impact was considered for both the construction and operational phases.

	Without mitigation	With mitigation
Extent	Low (2)	Low (2)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	High (80)	Medium (60)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, albeit to a limited extent.	

Mitigation:

» Solar panels must be mounted on pile-driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity (Bennun et al, 2021). If concrete foundations are used that would increase the impact of the project as there would be direct impacts to soil permeability and characteristics, thereby influencing inhabitant fauna. In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas.

» Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). The photographs below are sourced from these documents.



- » Vegetation clearing to commence only after the necessary permits have been obtained.
- » Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
- » No development is to occur within the riparian buffer zones.

Residual Impacts:

The loss of indigenous vegetation is an unavoidable consequence of the development and cannot be entirely mitigated. The residual impact would be moderate.

Impact Nature: Encroachment of Invasive Alien Plants into disturbed areas

Invasive Alien Plants (IAPs) tend to encroach into disturbed areas and can outcompete/displace indigenous vegetation.

	Without mitigation	With mitigation
Extent	Moderate (3)	Moderate (3)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	High (64)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- » An IAP Management Plan must be written for the development.
- » Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as a result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project.
- » All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan.

Residual Impacts:

Based on the lack of IAPs within the development area and the implementation of an IAP Management Plan there are unlikely to be residual impacts

Impact Nature: Soil erosion and continued habitat degradation

Disturbance created during the construction phase will leave the development area vulnerable to erosion

	Without mitigation	With mitigation
Extent	Moderate (3)	Moderate (3)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	High (64)	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"> » A Rehabilitation Plan must be written for the development area and ensured that it be adhered to. » Access roads should have run-off control features that redirect water flow and dissipate any energy in the water which may pose an erosion risk. » All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. » There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial shrubs and succulents from the area. 		
Residual Impacts:		
There is still the potential for erosion but would have a low impact.		

Impact Nature: Impacts to fauna movement patterns due to reflection effects		
The reflection caused by solar panels may affect the movement patterns of fauna within the landscape		
	Without Mitigation	With Mitigation
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (48)	Low (30)
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun <i>et al.</i>, 2021). The reflection caused by the panels attracts numerous insects as the panels are perceived as water bodies. This will negatively impact surrounding ecosystems due to the loss of biota and will result in an influx of fauna attempting to feed on the insects. 		
Residual Impacts		
There is still the potential for reflection impacts but would have a low impact.		

Impact Nature: Disturbance or persecution of fauna		
The operation and maintenance of the Solar Energy Facility may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without Mitigation	With Mitigation
Extent	Low (2)	Low (2)
Duration	Long term (4)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Probable (3)	Very improbable (1)
Significance	Medium (42)	Low (5)
Status	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	

<p>Mitigation:</p> <ul style="list-style-type: none"> » All staff are to be educated on the importance of local fauna and must be made aware that no poaching or persecution is allowed. » Any fauna threatened by the maintenance and operational activities should be removed to a safe location by an appropriate individual. » All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions. Appropriate signs must be erected. » If any excavations are to be dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night.
<p>Residual Impacts:</p> <p>Disturbance from maintenance activities will occur albeit at a low and infrequent level.</p>

Decommissioning/Rehabilitation Phase

Impact Nature: Direct mortality of fauna		
Decommissioning activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions and persecution.		
	Without mitigation	With mitigation
Extent	Moderate (3)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (44)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, vehicle collisions, poaching, and persecution can be mitigated.	
<p>Mitigation:</p> <ul style="list-style-type: none"> » All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species. » Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate. » Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. » All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. » All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel, and oil spills that occur at the site should be cleaned up in the appropriate manner. » Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter. 		
<p>Residual Impacts:</p> <p>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.</p>		

Impact Nature: Continued habitat degradation		
Disturbance created during decommissioning will leave the development area vulnerable to erosion and alien plant invasion for several years.		
	Without Mitigation	With Mitigation
Extent	Low (2)	Very Low (1)
Duration	Long-term (4)	Long-term (3)

Magnitude	Medium (3)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Medium (27)	Low (12)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Yes	No
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"> » Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase. » Monitoring of the rehabilitated area must be undertaken at quarterly intervals for 3 years after the decommissioning phase. » All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. » There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora. 		
Residual Impacts:		
No significant residual risks are expected, although IAP encroachment and erosion might still occur but would have a negligible impact if effectively managed.		

7.4.5 Implications for Project Implementation

The main expected impacts of the proposed Brakpan 1 Solar Energy Facility will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, the project possesses a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted. Moreover, the avoidance and minimisation mitigation measures are the most important with respect to the mitigation hierarchy.

In order to evaluate the extent of 'avoidance' achieved for the project, the following is noteworthy:

- » The footprint areas for the four proposed solar facilities proposed as part of the Poortjie Wes cluster amounts to 1 144.645 ha; and
- » The total extent of the entire property area comprising 49 337.900 ha, thus approximately 2% of the property area will be developed.

The project area has been designated as a REDZ (Renewable Energy Development Zone) and taking into consideration the extent of 'avoidance' achieved for the project through minimisation of the development footprint, it is the opinion of the specialist that the authorisation of the proposed project may be favourably considered. It is recommended that should any additional future developments be proposed for the remaining extent of any 'Very High' or 'High' SEI areas within the associated properties, offset strategies should be required for these authorisations.

The PAOI is located within an Upstream Management Area according to the NFEPA database. There are two minor ephemeral drainage lines that traverse the PAOI. However, the channel physiognomy of these drainage systems was not considerably distinct from the terrestrial component and could be regarded as an arid dendritic network. These systems were identified by the distinct soil of the preferential flow paths and the presence of *Vachellia karoo*.

A 50 m buffer was applied to these drainage systems (Macfarlane et al, 2009) as they are regarded as Ecological Support Areas and during surface flow would be important in the distribution of propagules.

The following Zones of Regulation (ZoR) are applicable to the drainage lines identified within the PAOI:

- » A 32 m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) should be assigned to the drainage lines; and
- » A 100 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) should be assigned to the drainage lines.

The proposed solar facility is expected to pose a low residual risk to the delineated drainage lines, with key mitigation being the avoidance and adherence to the recommended buffer widths. Due to the low residual risk, a General Authorisation is required for the required water use authorisation.

7.5. Assessment of Impacts on Avifauna

The development and operation of Brakpan 1 Solar Energy Facility will have an impact on avifauna species and habitats. A detailed assessment is provided in the specialist report included in Appendix E.

7.5.1 Findings of the Avifauna Monitoring

The baseline avifaunal surveys included two site visits timed to record the maximum variation in climatic conditions and included the likely peak in avifaunal abundance. Rainfall is generally unpredictable in the area with sporadic events occurring throughout the year and not restricted to any particular season. Therefore, the timing of the avifaunal baseline monitoring was determined to align with the predicted breeding and display and breeding period of Ludwig's Bustard and Southern Black Korhaan (spring) and the peak presence of summer migratory species (summer).

The diversity and abundance of birds observed during the walk transects was low, with eleven positively identified species recorded during Season 1 and 19 species during Season 2. The abundance of birds recorded during Season 1 (64 individuals) was lower than during Season 2 (143 individuals) as expected. The only avifaunal SCC recorded during either season was Ludwig's Bustard, and while this species was recorded on multiple occasions this may represent the same individual.

Table 7.1: Diversity and abundance of avifaunal species recorded in and around the proposed facility.

Season 1	Transect									
Species	WTA1.1	WTA1.2	WTA1.3	WTA1.4	WTA1.5	WTA1.6	WTAI A	WTAI B	WTAI C	Grand Total
African Pipit		1								1
Cape Sparrow				1						1
Eastern Clapper Lark					1		1			2
Grey-backed Sparrow-Lark		18								18
Karoo Korhaan			1							1
Large-billed Lark							4			4
Ludwig's Bustard							1			1
Namaqua Sandgrouse					1			1	2	4
Red-capped Lark				2	2					4
Spike-heeled Lark		1			1	1	3			6
Spotted Thick-knee		1								1
Unidentified	2	2	2	2	3	2	2	4	2	18
Grand Total	2	23	3	5	8	3	11	5	4	64
Season 2	Transect									
Species	WTA1.1	WTA1.2	WTA1.3	WTA1.4	WTA1.5	WTA1.6	WTAI A	WTAI B	WTAI C	Grand Total
African Black Swift	10									10
African Pipit	5	3					3	3	1	15
Barn Swallow	2			1	8				1	12
Common Buzzard						1				1
Desert Cisticola	5	5	2	2	2	2	2	2		22
Eastern Clapper Lark	3	3			2	2			1	11
Egyptian Goose	2				3					5
Grey-backed Sparrow-Lark	2	2					2	5	4	15
Karoo Long-billed Lark						1				1
Karoo Prinia				1		1				2
Large-billed Lark		2			2				2	6
Lark-like Bunting							3			3
Ludwig's Bustard	1		1						1	3
Neddicky					1					1
Red-billed Quelea							16			16
Red-capped Lark	3	1			2	7				13
Rufous-eared Warbler	2									2
Sabota Lark				1			1			2
Spur-winged Goose							1			1
Unidentified				1		1				2
Grand Total	35	16	3	6	20	15	28	10	10	143

Avifaunal SCCs observed in the broader area include Martial Eagle, Lanner Falcon, Secretary bird, Blue Crane, Karoo Korhaan, Southern Black Korhaan, and Verreux's Eagle. The output from the Screening Tool (as of 2022-05-27) indicated that the majority of area site was of high sensitivity in the Animal Species Theme,

with patches of high sensitivity due to the potential presence of several avifaunal species of conservation concern (SCCs), namely Black Harrier (*Circus maurus*), Ludwig's Bustard (*Neotis ludwigii*), Lanner Falcon (*Falco biarmicus*), Martial Eagle (*Polemaetus bellicosus*) and Verreaux's Eagle (*Aquila verreauxii*) and medium sensitivity for possible presence of Black Stork (*Ciconia nigra*) and Southern Black Korhaan.

7.5.2 Description of Impacts on Avifauna

Potential impacts on avifauna anticipated to occur with the development of Brakpan 1 Solar Energy Facility include:

- » Direct Habitat destruction
- » Disturbance and Displacement
- » Direct Mortality

7.5.3 Impact tables summarising the significance of impacts on avifauna during construction, operation, and decommissioning

The various identified impacts are assessed below for the different phases of the development:

Construction Phase Impacts

Nature: Habitat destruction due to clearing of vegetation in the development footprint for the construction of infrastructure such as solar PV arrays, temporary laydown areas, site buildings, servitudes and access roads. This results in loss of area available to avifaunal species for foraging and breeding.		
	Without mitigation	With mitigation
Extent	Local (2)	Footprint (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (1)	Small (0)
Probability	Definite (5)	Definite (5)
Significance	Medium (35)	Low (25)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Partially	
Mitigation:		
<ul style="list-style-type: none"> » Laydown and other temporary infrastructure to be placed within very low sensitivity areas, preferably previously transformed areas, wherever possible; » Appropriate run-off and erosion control measures are to be implemented where required; » A site-specific environmental management programme (EMPr) must be implemented, which gives an appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat (e.g. no open fires outside of designated areas); 		

- » All contractors are to adhere to the EMPr and should apply good environmental practice during construction;
- » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site and downstream environments. Any accidental chemical, fuel, and oil spills that occur at the site should be cleared as appropriate for the nature of the spill;
- » Existing roads and farm tracks should be used where possible;
- » The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths;
- » No off-road driving should be permitted in areas not identified for clearing;
- » An Environmental Site Officer (ESO) must form part of the on-site team to ensure that the EMPr is implemented and enforced and an Environmental Control Officer ("ECO") must be appointed to oversee the implementation activities and monitor compliance for the duration of the construction phase; and
- » Following construction, rehabilitation of areas disturbed by temporary laydown areas and facilities must be undertaken.

Residual Impacts:

Habitat cleared for the construction of permanent facilities will not be available for use by avifaunal species during the operational lifespan of the development. No long-term residual impacts are likely to negatively influence the viability or persistence of the avifaunal community of the receiving environment.

Nature: Disturbance or displacement of birds due to increased noise and activity levels associated with construction machinery and personnel resulting in an indirect loss of habitat available for foraging and breeding. Project area already experiences relatively high levels of regular disturbance from commercial crop production activities.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Very Short-term (1)	Very Short-term (1)
Magnitude	Minor (2)	Minor (2)
Probability	Low Likelihood (2)	Low Likelihood (2)
Significance	Low (10)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Yes	

Mitigation:

- » A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted;

- » All contractors are to adhere to the EMPr and should apply good environmental practice during construction;
- » Environmental Officer to oversee activities and ensure that the site-specific EMPr is implemented and enforced;
- » Maximum use of existing access roads and servitudes;
- » Existing and novel access roads are to be suitably upgraded or constructed to prevent damage and erosion resulting from increased vehicular traffic and construction vehicles;
- » No off-road driving in undesignated areas;
- » Speed limits (30 km/h) should be strictly enforced on-site to reduce unnecessary noise;
- » Construction camps should be lit with as little light as practically possible, with the lights directed downwards where appropriate;
- » The movement of construction personnel should be restricted to the construction areas on the project site;
- » No dogs or cats other than those of the landowners should be allowed on site;
- » The appointed Environmental Officer must be trained to identify the potential Red Data species as well as the signs that indicate possible breeding by these species;
- » The Environmental Officer must then, during audits/site visits, make a concerted effort to look out for such breeding activities of SCCs (e.g. cranes, Secretarybird), and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species;
- » If any avifaunal SCCs are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed;
- » Prior to construction, an avifaunal specialist should conduct a site walkthrough, covering the final road and power line routes as well as temporary laydown areas and facilities, to identify any nests/breeding/roosting activity of sensitive species;
- » The results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around breeding activity, and lowering levels of associated noise.

Residual Impacts:

None.

Nature: Avifaunal fatalities caused by construction activity including vehicle collision (i.e. roadkill), entrapment within security fencing, or uncovered excavations.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Very Short-term (1)	Very Short-term (1)
Magnitude	Minor (2)	Minor (2)
Probability	Distinct Possibility (3)	Low Likelihood (2)
Significance	Low (15)	Low (10)

Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Maximum use of existing access roads and servitudes; » No off-road driving in undesignated areas; » Speed limits (30 km/h) should be strictly enforced on-site to reduce the probability of vehicle collisions; » The movement of construction personnel should be restricted to the construction areas on the project site; » No dogs or cats other than those of the landowners should be allowed on site; » Any holes dug e.g. for foundations of pylons should not be left open for extended periods of time to prevent entrapment by ground-dwelling avifauna or their young and only be dug when required and filled in soon thereafter; » Temporary fencing must be suitably constructed, e.g. if double layers of fencing are required for security purposes they should be positioned at least 2 m apart to reduce the probability of entrapment by larger-bodied species that may find themselves between the two fences; » Roadkill is to be reported to the ECO and removed as soon as possible. 		
Residual Impacts:		
None.		

Operational Phase Impacts

Nature: Habitat destruction due to contamination or altered flow regimes impacting downstream environments.		
	Without mitigation	With mitigation
Extent	Local (2)	Footprint (1)
Duration	Long-term (4)	Long-term (2)
Magnitude	Minor (1)	Minor (2)
Probability	Definite (5)	Improbable (2)
Significance	Medium (35)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	Difficult	Yes
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Effectively.	
Mitigation:		
<ul style="list-style-type: none"> » Flow- and erosion control measures are to be implemented where appropriate to reduce uncontrolled runoff from hard surfaces; 		

- » All cleaning products used on the site should be environmentally friendly and biodegradable; and
- » The operational environmental management programme must include site-specific measures for the effective management and treatment of any wastewater to be produced.

Residual Impacts:

None.

Nature: Disturbance or displacement of birds due to increased noise and activity levels associated with operational activities resulting in an indirect loss of habitat available for foraging and breeding.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Very Short-term (1)	Very Short-term (1)
Magnitude	Minor (2)	Minor (2)
Probability	Low Likelihood (2)	Low Likelihood (2)
Significance	Low (10)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Yes	

Mitigation:

- » A site-specific operational EMP must be implemented, which gives an appropriate and detailed description of how operational and maintenance activities must be conducted to reduce unnecessary disturbance;
- » All contractors are to adhere to the environmental management programme and should apply good environmental practice during all operations; and
- » Operational phase bird monitoring, in line with the latest available guidelines, must be implemented.

Residual Impacts:

None.

Nature: Bird fatalities due to collision entrapment.

	Without mitigation	With mitigation
Extent	Local (3)	Local (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Low Likelihood (2)	Low Likelihood (2)
Significance	Low (22)	Low (22)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes

Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Partially	
<p>Mitigation:</p> <ul style="list-style-type: none"> » Internal power lines should be buried wherever possible; » Novel above-ground overhead power lines to be constructed adjacent to existing transmission infrastructure where possible and pylons to be staggered (where possible) relative to existing pylon positions to increase the overall visibility of transmission infrastructure to avifauna such as bustards; » Appropriate (approved) Bird flight diverters (BFDs) to be affixed to the entire length of novel above-ground overhead power lines; » If one or more avifaunal SCC carcasses are located and determined likely to have resulted from collisions with infrastructure in any sensitivity area over the lifespan of the facility the fatality is to be appropriately recorded and reported to an avifaunal specialist to determine the most appropriate action; » If double layers of fencing are required for security purposes they should be positioned at least 2 m apart to reduce the probability of entrapment by larger bodied species that may find themselves between the two fences; » Develop and implement a carcass search and bird activity monitoring programme in-line with the latest applicable guidelines; » Regular reviews of operational phase monitoring data (activity and carcass) and results to be conducted by an avifaunal specialist; » Lighting should be kept to a minimum to avoid attracting insects and birds and light sensors/switches should be utilised to keep lights off when not required; » Lighting fixtures should be hooded and directed downward where possible, to minimize the skyward and horizontal illumination, lighting should be motion activated where possible; » Cattle grids should be modified to allow for any chicks that fall in to escape (e.g. by placing a ramp inside the structure); » If unacceptable impacts are observed (in the opinion of the bird specialist and independent review), the specialist should conduct a literature review specific to the impact and provide updated and relevant mitigation options to be implemented. 		
<p>Residual Impacts:</p> <p>Current mitigation measures, while effective, are not capable of completely preventing collisions and some residual impact will remain. Nevertheless, given the species most commonly at risk from solar PV developments, it is unlikely that the proposed development will have a significant negative impact on the long-term viability and persistence of SCCs in the area.</p>		

Decommissioning Phase Impacts

The impacts of the decommissioning phase are similar to those of the construction phase, with the exception of a reduced impact of habitat destruction. Temporary disassembly and storage areas associated with the

decommissioning phase are to be positioned on the same sites as those used for temporary laydown areas during the construction phase where possible to reduce the incidence of novel habitat destruction.

7.5.4 Implications for Project Implementation

From the findings of the Avifauna Study (refer to **Appendix E**) the proposed development site appears to be well suited for the development of renewable energy facilities as proposed. The proposed development site is located outside of major avifaunal sensitivities and does not represent unique avifaunal habitat in the context of the broader area. The available avifaunal habitat across the site is already modified through grazing pressure and is located relatively close to existing overhead transmission lines. This translates into a reduced length of novel overhead power line required for the grid connection, reducing the potential impact on species susceptible to collisions with transmission lines such as bustards, cranes, and storks in the area.

The proposed development is unlikely to have a significant negative impact on the long-term viability or persistence of avifaunal species in the area and therefore can be approved from an avifaunal perspective.

7.6. Assessment of Impacts on Heritage (including archaeological and palaeontological resources)

The development and operation of the Brakpan 1 Solar Energy Facility will have an impact on heritage resources. A detailed assessment is provided in the specialist report included in Appendix F.

7.6.1 Findings of the Heritage Assessment

Cultural Landscape

Brakpan PV 1 (Option A) falls within the Juriesfontein Plains Landscape Character Area. For this Landscape Character Area, the following heritage indicators apply:

- » Poortjie Wes settlement: 1km radius buffer
- » Kruidfontein, Louws Baken: 500m radius buffer
- » Buffelsrivier: 250m buffer either side
- » Poortjie dam: 250m radius buffer
- » Poortjie koppies: 250m buffer

The proposed PV facility is aligned with the heritage indicators as it is located on the flat and lower slopes and avoids sensitive heritage receptors. No significant impact on the cultural landscape is anticipated from this proposed development.

Archaeology

The impact on identified heritage resources will not be substantial and will have an overall negligible change on the archaeological sensitivity of the Nelspoort area. The majority of the lithic material identified is of low significance (not conservation-worthy), and even though the resources may be destroyed during construction, the impact is inconsequential. No mitigation is required for archaeological material recorded in the footprint areas of the proposed development.

Despite the high number of observations of artefacts, these resources are common and representative of similar scatters across widespread areas of the Karoo. Despite the very high numbers of observations made,

the archaeological material is ubiquitous across the entire area and in general, the results of this assessment indicate that the archaeological sensitivity of the development area is low.

Palaeontology

The proposed development area on Farm Poortje 76 (1: 50 000 map 3222AB Kareebosch) is situated in low-lying, flattish terrain at around 990 to 1050m amsl. It lies between a N-S trending range of hills intruded by dolerite dykes in the west and a major dolerite ridge some 6 km to the east that runs near Poortjie Wes Farmstead. Satellite images suggest that bedrocks here are folded along W-E axes. The area mainly comprises gravelly to sandy vlaktes traversed by a few shallow stream lines draining to the SE. Satellite images show several pale areas of fine-grained silty alluvium, sheetwash, and pan sediments with a few darker grey areas suggesting Beaufort Group mudrock exposure. However, most of these latter areas are covered with grey-green mudrock gravels or dark brown, ferruginised sandstone rubble with very little solid bedrock exposure. Where bedrocks crop out at surface there are occasional low rocky ridges of brownish sandstone, sometimes flaggy. Most of the project area is mantled by alluvial sands and gravels, eluvial and sheetwash surface gravels of wacke, mudstone flakes, dolerite, sparse rolled bone, and reworked palaeocalcrete concretions (some secondarily ferruginised). There are also sparse clasts of grey-green, greenish-brown, orange-patinated, cherty material with numerous bubble-like cavities which is probably of intrusive igneous origin. Rusty-brown, ferruginous carbonate pedocrete concretions which have weathered out from the underlying overbank mudrocks dominate eluvial surface gravels locally. Many areas of sandy alluvial soils feature dense to clumped grassy vegetation, limiting visibility.

Concentrations of weathered-out, disarticulated and fragmentary fossil remains of large-bodied tetrapods – possibly pareiasaur or large dicynodont such as Endothiodon - occur locally within surface float and sheetwash gravels; some of this material is potentially identifiable. There are also widely scattered chunks of pinkish to lilac, well-rounded, partially ferruginised bone material ("rolled bone") which are probably unidentifiable. They occur especially in areas where high concentrations of ferruginous pedocrete concretions are weathering out at surface.

Three palaeontological observations of moderate local significance were identified within the footprint proposed for the Brakpan 1 Solar Energy Facility (380, 381, and 385). These fossils must be collected by a palaeontologist prior to construction. This must be done under a workplan application in terms of section 38(8) to be submitted by a palaeontologist and approved by HWC. An additional two fossil observations of contextual significance were also identified within Option A (388 and 390) however no additional mitigation is required for these fossils.

Given the potential for the exposure or recognition of additional, scientifically valuable fossil occurrences within the project footprints, a Chance Fossil Finds Protocol, as outlined below and tabulated in Appendix 2, must be included within the Environmental Management Programme (EMPr) and fully implemented throughout the construction phase of the solar projects.

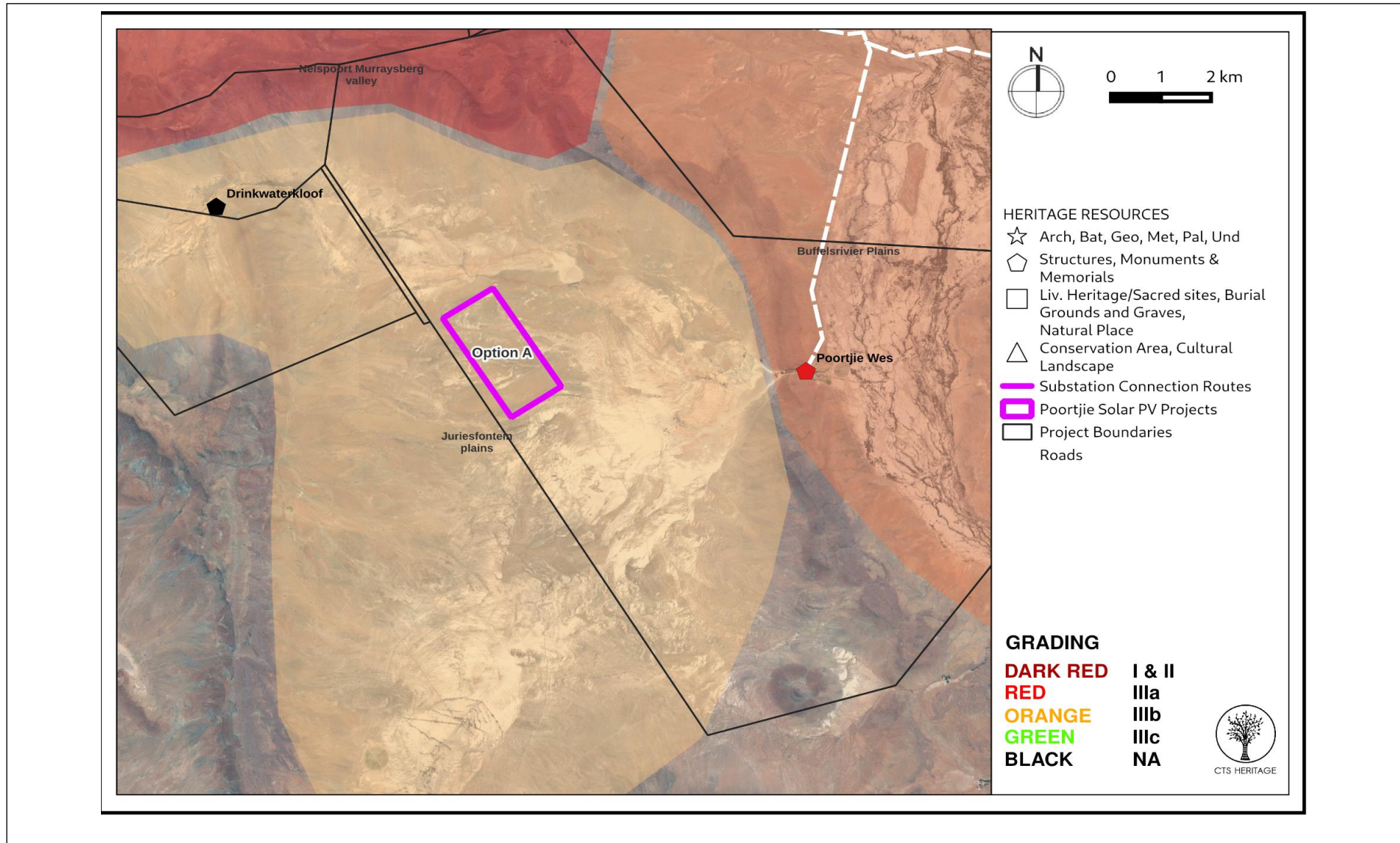


Figure 7.4: Map of Landscape Character Areas and farmsteads and settlements within proximity to Brakpan 1 Solar Energy facility (Option A)

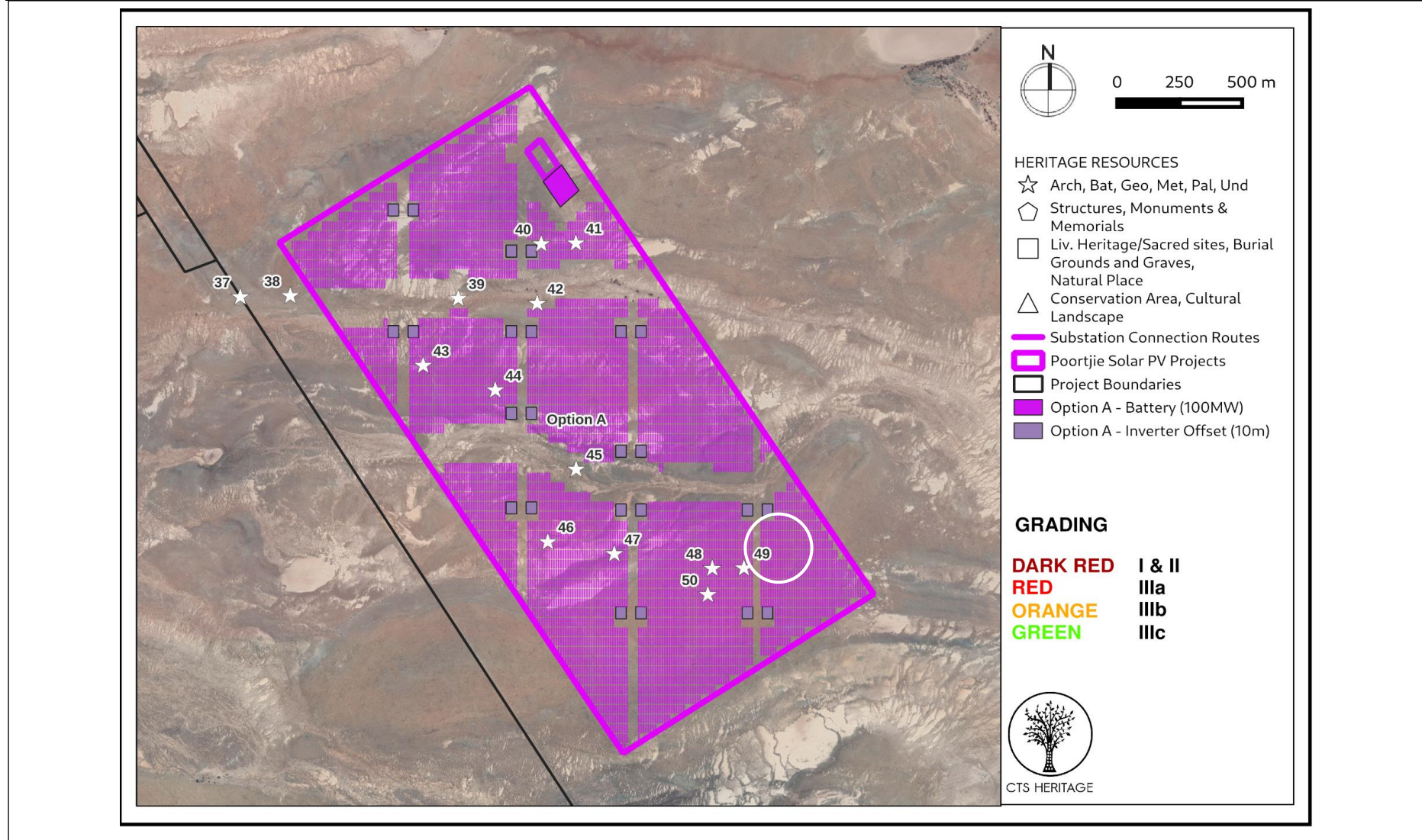


Figure 7.5: Map of archaeological heritage resources recorded within the proposed development area

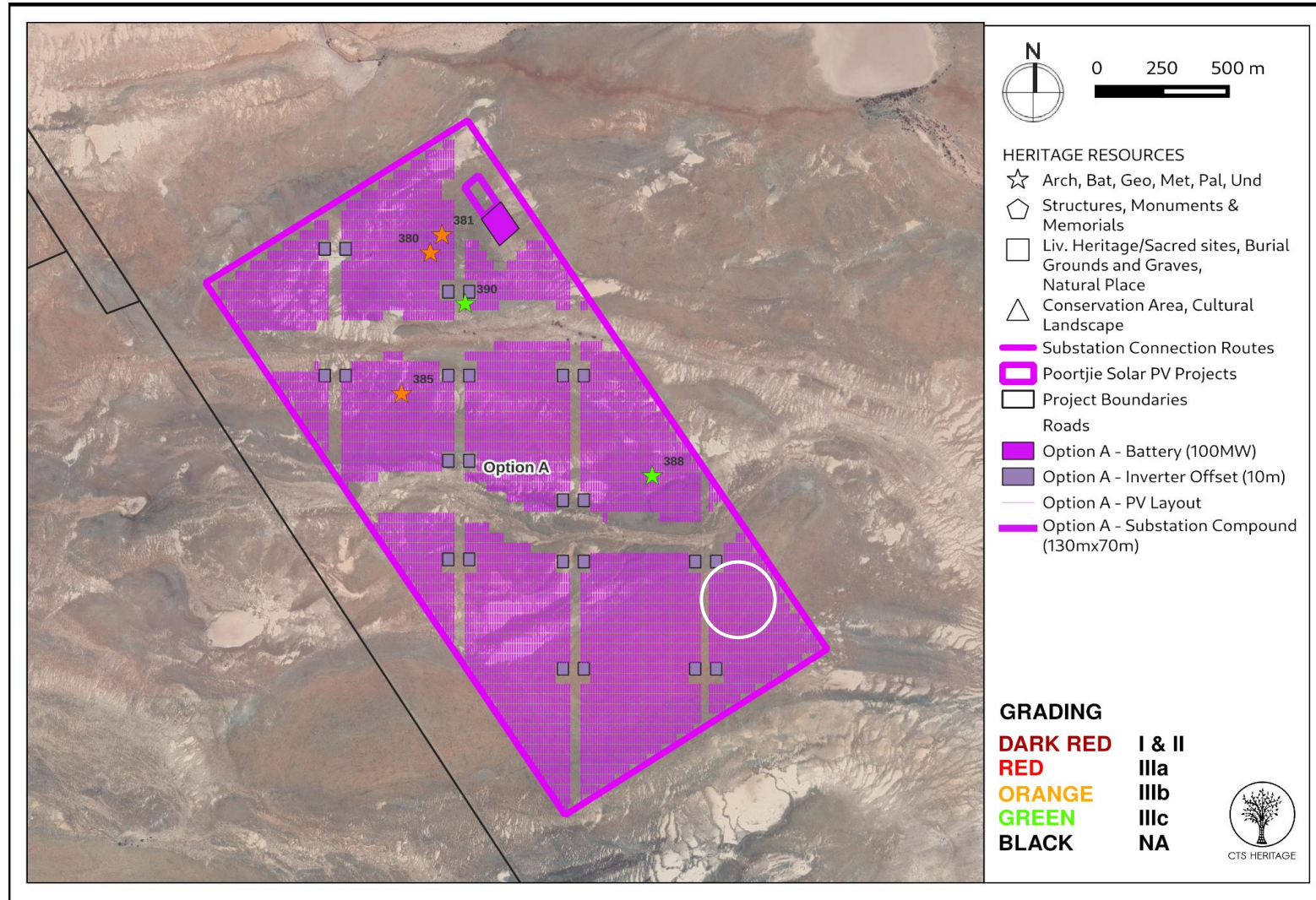


Figure 7.6: Map of palaeontological heritage resources recorded within the proposed development area

7.6.2 Description of Heritage Impacts (including archaeology and palaeontology)

Potential impacts on Heritage resources anticipated to occur with the development of Brakpan 1 Solar Energy Facility include:

- » Impacts on the cultural landscape
- » Impacts on archaeological and palaeontological resources

7.6.3 Impact table summarising the significance of the impact on heritage and palaeontological resources during construction

The impacts assessed below apply to the development area assessed for Brakpan 1 Solar Energy facility.

Nature: Impact table for Cultural Landscape Heritage Resources for the proposed Brakpan 1 PV Facility				
The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development				
		Before Mitigation		After Mitigation
Magnitude	L (4)	While the cultural value of the pristine Karoo Landscape is very high, the location of the proposed PV infrastructure means that only a slight impact to the cultural landscape will result from the proposed development.	L (4)	While the cultural value of the pristine Karoo Landscape is very high, the location of the proposed PV infrastructure means that only a slight impact to the cultural landscape will result from the proposed development.
Duration	H (4)	Where manifest, the impact will be long term - for the duration of the PV infrastructure lifetime	H (4)	Where manifest, the impact will be long term - for the duration of the PV infrastructure lifetime
Extent	H (5)	Regional	H (5)	Regional
Probability	L (2)	It is unlikely that any significant cultural landscape resources will be impacted	L (2)	It is unlikely that any significant cultural landscape resources will be impacted
Significance	L	$(5+4+4) \times 2 = 26$	L	$(5+4+4) \times 2 = 26$
Status		Neutral		Neutral
Reversibility	L	Any impacts to heritage resources that do occur are reversible once the PV infrastructure is removed	L	Any impacts to heritage resources that do occur are reversible once the Infrastructure is removed
Irreplaceable Loss of Resources?	L	Unlikely	L	Unlikely
Can Impacts be Mitigated		NA		
Mitigation: NA				
Residual Risk: NA				

Nature: Impact table for Archaeological Heritage Resources

The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development			
		Before Mitigation	After Mitigation
Magnitude	L (2)	No significant archaeological resources were identified within the development area	L (2) No significant archaeological resources were identified within the development area
Duration	H (5)	Where manifest, the impact will be permanent.	H (5) Where manifest, the impact will be permanent.
Extent	L (1)	Localised within the site boundary	L (1) Localised within the site boundary
Probability	L (1)	It is extremely unlikely that any significant archaeological resources will be impacted	L (1) It is extremely unlikely that any significant archaeological resources will be impacted
Significance	L	$(2+5+1) \times 1 = 8$	L $(2+5+1) \times 1 = 8$
Status		Neutral	Neutral
Reversibility	L	Any impacts to heritage resources that do occur are irreversible	L Any impacts to heritage resources that do occur are irreversible
Irreplaceable Loss of Resources?	L	Unlikely	L Unlikely
Can Impacts Be Mitigated		NA	
Mitigation: Should any significant archaeological resources be uncovered during the course of the construction phase, work must cease in the area of the find and SAHRA must be contacted regarding an appropriate way forward.			
Residual Risk: Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources			

Nature: Impact table for Palaeontological Heritage Resources			
The area proposed for development is known to conserve heritage resources of palaeontological significance that may be impacted by the proposed development			
		Before Mitigation	After Mitigation
Magnitude	H (8)	Five significant palaeontological resources were identified within the development area, and the geology underlying the development area is very sensitive for impacts to significant fossils	H (8) Five significant palaeontological resources were identified within the development area, and the geology underlying the development area is very sensitive for impacts of significant fossils
Duration	H (5)	Where manifest, the impact will be permanent.	H (5) Where manifest, the impact will be permanent.
Extent	L (1)	Localised within the site boundary	L (1) Localised within the site boundary
Probability	H (5)	It is extremely likely that significant palaeontological resources will be negatively impacted	L (1) It is possible that any significant paleontological resources will be negatively impacted
Significance	H	$(1+5+8) \times 5 = 70$	L $(1+5+8) \times 1 = 14$
Status		Neutral	Neutral

Reversibility	L	Any impacts on heritage resources that do occur are irreversible	L	Any impacts on heritage resources that do occur are irreversible
Irreplaceable Loss Of Resources?	H	Likely	L	Unlikely
Can Impacts Be Mitigated		Yes		
Mitigation:				
<ul style="list-style-type: none"> » Palaeontological observations 380, 381 and 385 must be collected by a palaeontologist under an approved workplan application prior to construction » The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities 				
Residual Risk:				
Should any significant palaeontological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources				

7.6.4 Implications on Project Implementation

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social, and scientific reasons. The site possesses a number of landscape elements contributing to a composite cultural landscape. Significant from a landscape perspective is the distinctive poort and its associated dam, linkage route, and topographical condition. The area is of medium to high sensitivity in terms of the placement of renewable energy infrastructure. The principle of locating PV infrastructure in this environment is acceptable especially if occurring on the flatlands and lower slopes and avoiding the immediate landscape setting of the poort.

No archaeological resources of significance were identified within the area proposed for development although the broader area has archaeological significance in terms of the sensitive dolerite outcrops in the area. No impacts to significant archaeological heritage are anticipated.

Five observations of palaeontological significance were noted within the area proposed for development. Three of these have higher levels of significance and are graded IIIB. These paleontological resources must be collected by a palaeontologist under an approved workplan prior to construction.

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of a renewable energy facility in this location is supported from a heritage perspective provided that the infrastructure is located in areas able to tolerate the impact of the high degree of change from a cultural landscape perspective.

Based on the outcomes of the specialist study, it is not anticipated that the proposed development of the solar PV facility and its associated grid connection infrastructure will negatively impact on significant heritage resources on condition that the following recommendations are adhered to:

- » The recommendations of the VIA must be implemented.
- » Palaeontological observations 380, 381 and 385 must be collected by a palaeontologist prior to construction. This must be done under a workplan application in terms of section 38(8) to be submitted by a palaeontologist and approved by HWC
- » The HWC Chance Fossil Finds Procedure must be implemented for the duration of construction activities

- » Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials, or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and HWC must be alerted immediately to determine an appropriate way forward.

7.7. Assessment of Visual Impacts

The development and operation of the Brakpan 1 Solar Energy Facility will have an impact on visual quality of the area. A detailed assessment is provided in the specialist report included in Appendix G.

7.7.1 Findings of the Visual Assessment

Visibility

Visual Absorption Capacity (VAC) is the capacity of the receiving environment to absorb the potential visual impact of the proposed development. VAC is primarily a function of the vegetation and will be high if the vegetation is tall, dense, and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and development decreases.

The land cover within the study area is predominately low shrubland and bare rock and soil with small, scattered areas of dryland agriculture and exotic plantations. As a result, the landscape is characterised by wide-open expanses of extreme isolation. Overall, the Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low by virtue of the low growing vegetation and sparsely populated/limited development overall.

Where homesteads do occur, vegetation and trees may have been planted which would contribute to the visual absorption and the VAC would be slightly higher. As this is not a consistent occurrence, however, VAC will not be considered for any of the homesteads, again assuming a worst-case scenario.

The VAC would also be high where the environment can readily absorb the development in terms of texture, colour, form and light / shade characteristics. On the other hand, the VAC for a development contrasting markedly with one or more of the characteristics of the environment would be low. While the height of the proposed infrastructure is not significant, the type of the facility in terms of the reflective nature of the solar panels will contrast significantly within the natural environment leading to VAC not being considered.

As a result of the low-lying vegetation, undeveloped nature of the study area, and the high contrast of the infrastructure within the surrounding receiving environment, VAC will not be considered for the visual impact assessment of the Brakpan 1 Solar Energy Facility.

The result of the viewshed analyses for the proposed Brakpan 1 Solar Energy Facility is shown in **Figure 7.8**.

An analysis has been undertaken within the proposed development area in order to determine the general visual exposure (visibility) of the area under investigation. A generic height of 5m was used in order to illustrate

the anticipated visual exposure of the solar energy facility. Typically, structures of this height (i.e. 5m) may be visible from up to 6km away. In this respect, the anticipated Zone of Visual Influence for this facility as calculated from the development footprint has been indicated at 6km. The extent of visual exposure within this zone is low.

The viewshed analysis does not include the effect of vegetation cover or existing structures on the exposure of the proposed facility, therefore signifying a worst-case scenario.

Figure 7.7 indicates areas from which any number of the proposed infrastructure could potentially be visible, as well as proximity offsets from the proposed facility. The following is an overview of the findings of the viewshed based on the layout illustrated on the Map provided:

- » The potential visual exposure of the facility is contained to a core area on the site itself and within a 1 km radius thereof. No sensitive visual receptors are located within the 1 km radius of the proposed site.
- » Potential visual exposure in the short to medium distance (i.e., between 1 and 3km), is scattered throughout with small visually screened areas to the north and southeast. No sensitive visual receptors are located within the 1-3 km radius of the proposed site.
- » In the medium to long distance (i.e. between 3 and 6km offset), the extent of potential visual exposure is fragmented throughout the area with small visually screened areas to the south east and west. Sensitive visual receptors include residents of Drinkwaterkloof, Hillside and Poortjie Wes.
- » Beyond the 6km offset from the proposed facility, potential visual exposure becomes extremely scattered and very low. Sensitive visual receptors are not likely to be visually exposed to the proposed facility, despite lying within the viewshed. In general, as a result of the scattered and lower population density of the study area, the Brakpan 1 SEF may constitute a visual prominence, potentially resulting in a moderate- low visual impact.

The results of visual exposure, viewer incidence / perception and visual distance of the proposed facility are displayed on **Figure 7.9**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index. An area with short distance, a high viewer incidence, and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing on the critical areas of potential impact when evaluating the issues related to the visual impact. The visual impact index for the proposed facility is further described as follows.

- The visual impact index map indicates a core zone of **high** visual impact within 1km of the proposed facility. There are no identified sensitive visual receptors within this core area.
- Visual impact is predominantly **moderate** between 1km and 3km of the proposed facility. There are no identified sensitive visual receptors within this core area.
- Visual impact is prominently **low** between 3 km and 6 km of the proposed facility. The identified receptors between 3km and 6km of the proposed facility, as listed below, are likely to experience **moderate** visual impact, should no mitigation be undertaken. Sensitive visual receptors within this zone comprise mainly the following users:
 - Residents of Drinkwaterkloof, Hillside, and Poortjie Wes.

- Beyond the 6 km of the proposed facility, the extent of potential visual impact is greatly reduced, and the magnitude is predominantly **very low** to negligible. It is not expected that sensitive receptors, if any, will be impacted visually by the proposed facility.

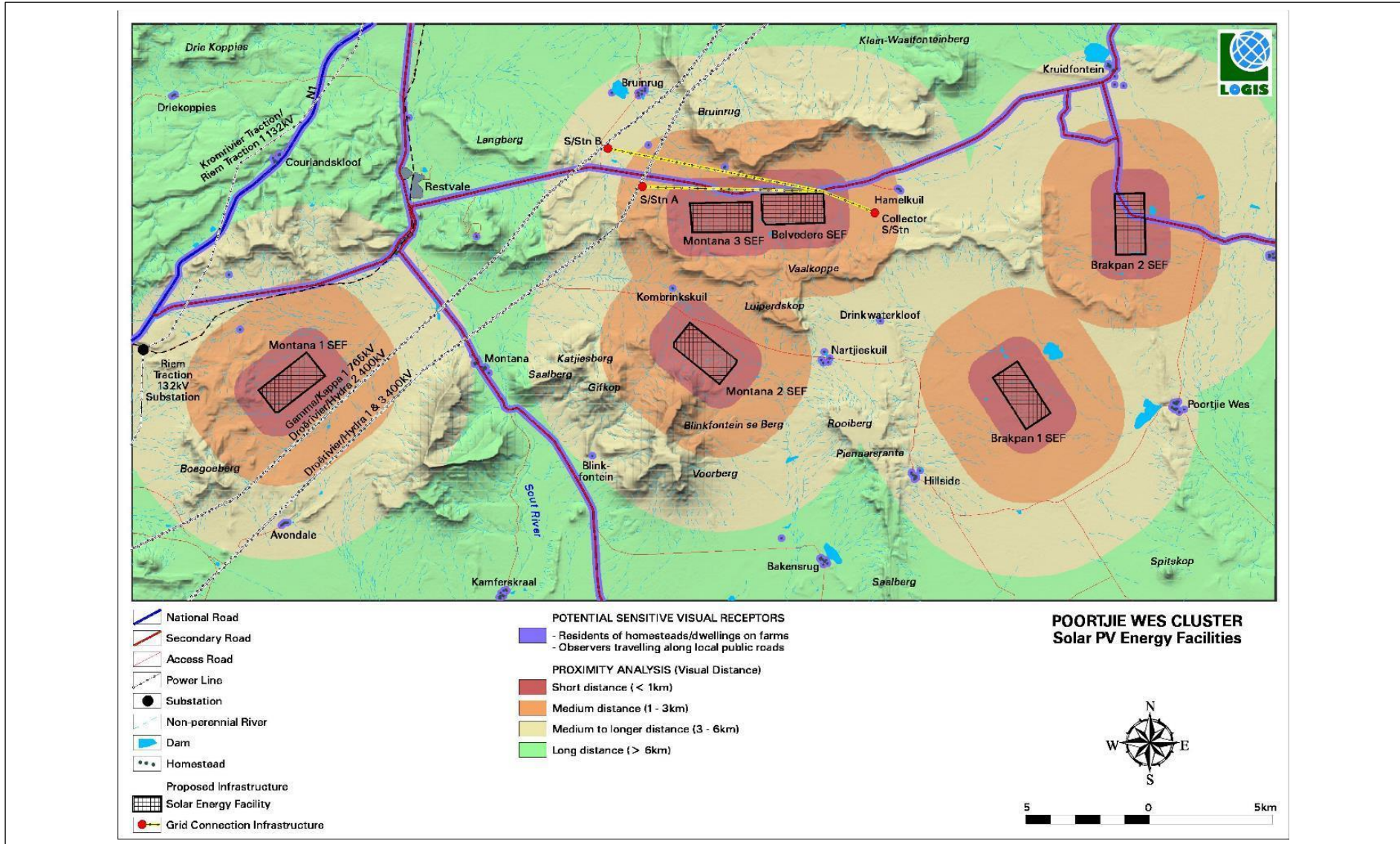


Figure 7.7: Visual proximity analysis of the proposed Brakpan 1 Solar Energy Facility

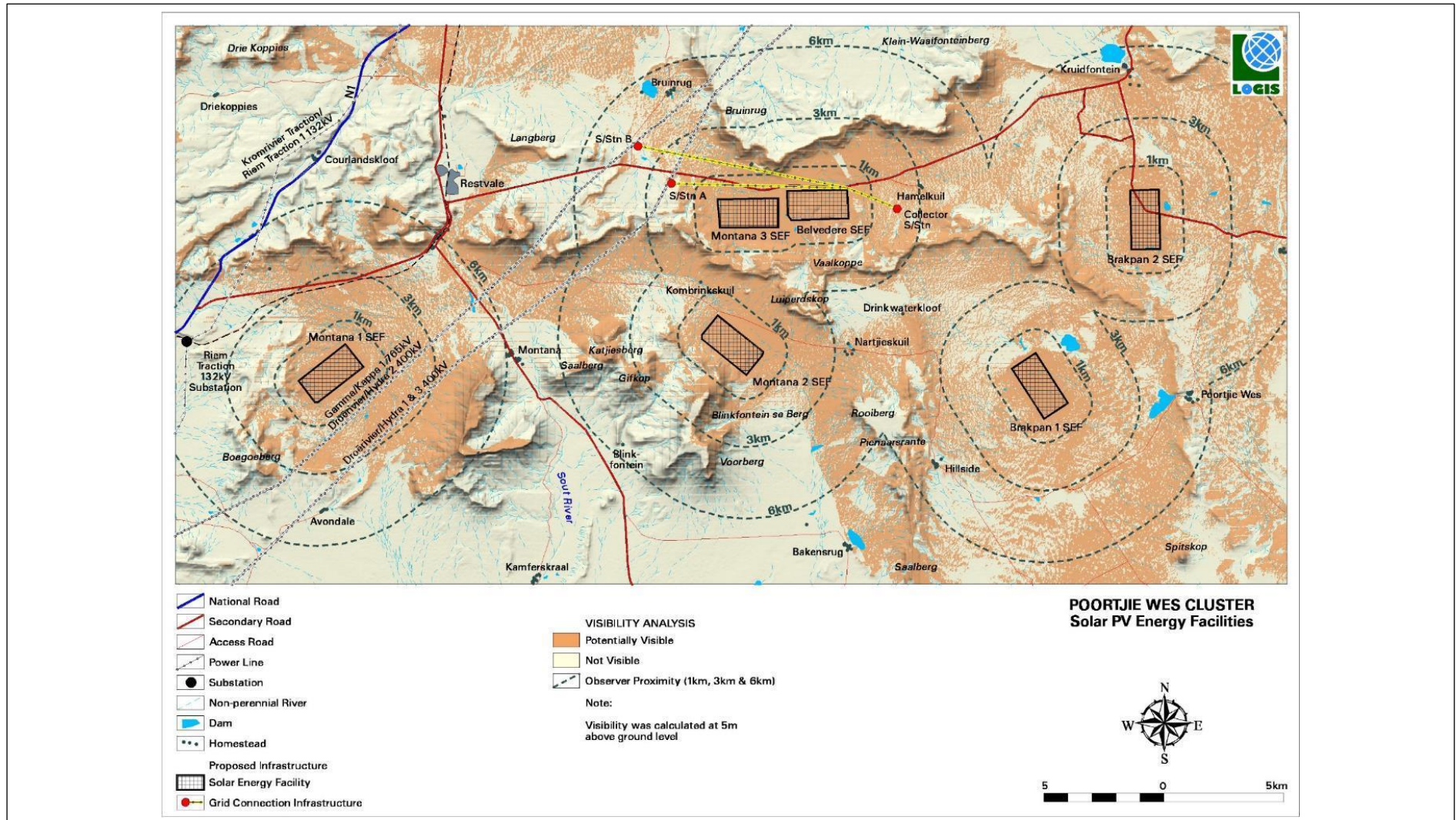


Figure 7.8: Potential visual exposure (viewshed analysis) of the proposed Brakpan 1 Solar energy Facility

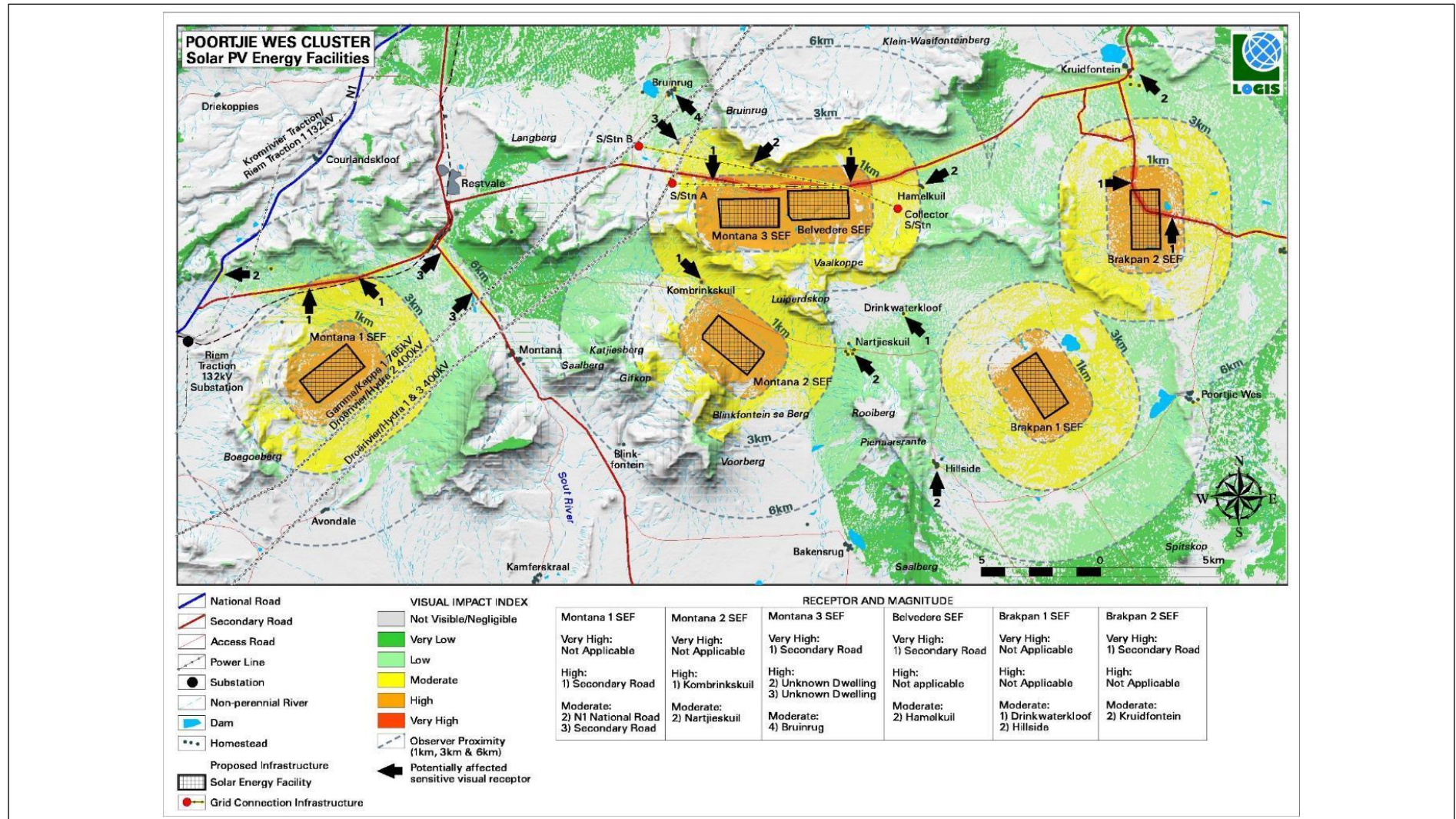


Figure 7.9: Visibility Index illustrating the frequency of exposure of the proposed Brakpan 1 Solar Energy Facility

7.7.2 Description of the Visual Impacts

In light of the results and findings of the Visual Impact Assessment undertaken for the proposed Brakpan 1 Solar energy Facility, it is acknowledged that the receiving environment will be visually transformed for the entire operational lifespan of the facility. Due to the nature of the development, impacts are expected to be limited to within 6km of the facility. The following is a summary of the impacts assessed:

- » The potential visual impact of the facility on sensitive visual receptors within 1km (residents of homesteads/dwellings and users of the secondary roads), in close proximity to the proposed facility is likely to be low.
- » The possible visual impact of the facility on the residents, homesteads and users of secondary road on the periphery of the 1km offset and within the region beyond is likely to be of low significance.
- » The potential visual impact of the associated infrastructure on residents of homesteads/dwellings and users of the secondary road within close proximity of the proposed facility is likely to be of low significance and may be mitigated to negligible should the possible best practice mitigation measures be implemented.
- » The potential visual impact of construction on sensitive visual receptors in close proximity to the facility is likely to be of low significance before mitigation and negligible post mitigation.
- » The anticipated visual impact of operational lighting at night on sensitive visual receptors within the study area is likely to be of moderate significance and may be mitigated to low should the possible best practice mitigation measures be implemented.
- » The potential visual impact of the proposed development on the visual quality of the landscape and sense of place of the region is likely to be of moderate significance both before and after mitigation.

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

Construction, Operation and Decommissioning Phases

Nature of Impact:		
Visual impact on the users of secondary roads and residents of homesteads in close proximity to the proposed infrastructure.		
	No mitigation	Mitigation considered
Extent	High (4)	N/A
Duration	Long term (4)	N/A
Magnitude	Very High (10)	N/A
Probability	Very improbable (1)	N/A
Significance	Low (18)	N/A
Status (positive or negative)	Negative	N/A
Reversibility	Recoverable (3)	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	No	
Mitigation / Management:		
<u>Planning:</u>		
<ul style="list-style-type: none"> » Respond to the natural environment during the planning of buildings and infrastructure. » Consolidate development and make use of already disturbed sites rather than pristine areas. » Do not exceed a height of 5m for all structures. » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. » Wherever possible, use materials, coatings, or paints that have little or no reflectivity. 		

<ul style="list-style-type: none"> » Commercial messages, symbols and/logos are not permitted on structures. » Use slight variations in topography to screen PV panels, where possible. Design linear features to follow natural land contours rather than straight lines. <p>Construction:</p> <ul style="list-style-type: none"> » Ensure that vegetation is not unnecessarily removed during the construction period. » Reduce the construction period through careful logistical planning and productive implementation of resources. » Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) wherever possible. » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. » Reduce and control construction dust using approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent). » Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. » Rehabilitate all disturbed areas immediately after the completion of construction works. <p>Residual impacts:</p> <p>None, provided that rehabilitation works are carried out as specified.</p>
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Nature of Impact:		
Visual impact on the users of secondary road on the periphery of the 1km offset and within the region beyond		
	No mitigation	Mitigation considered
Extent	Low (2)	N/A
Duration	Long (4)	N/A
Magnitude	Moderate (6)	N/A
Probability	Improbable (2)	N/A
Significance	Low (24)	N/A
Status (positive or negative)	Negative	N/A
Reversibility	Recoverable (3)	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	Yes	
Mitigation / Management:		
<u>Planning:</u>		
<ul style="list-style-type: none"> » Respond to the natural environment during the planning of buildings and infrastructure. » Consolidate development and make use of already disturbed sites rather than pristine areas. » Do not exceed a height of 5m for all structures. » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. » Wherever possible, use materials, coatings, or paints that have little or no reflectivity. » Commercial messages, symbols and/logos are not permitted on structures. » Use slight variations in topography to screen PV panels, where possible. Design linear features to follow natural land contours rather than straight lines. 		
<u>Operations:</u>		
<ul style="list-style-type: none"> » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. » Maintain the general appearance of the facility as a whole. » Monitor rehabilitated areas and implement remedial action as and when required. 		
<u>Decommissioning:</u>		
<ul style="list-style-type: none"> » Remove infrastructure not required for the post-decommissioning use of the site. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. » Monitor rehabilitated areas post-decommissioning and implement remedial actions. 		

Residual impacts:

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

Nature of Impact:

Visual impact of the associated infrastructure located on site on residents of farm and homesteads and users of the secondary road within close proximity to the proposed facility (within the 1 km offset)

	No mitigation	Mitigation considered
Extent	High (4)	High (4)
Duration	Long (4)	Long (4)
Magnitude	Very High (10)	None (0)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	Low (18)	Negligible (8)
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation / Management:

Site development & Operation:

- » Retain / re-establish and maintain large trees, natural features and noteworthy natural vegetation in all areas outside of the activity footprint.
- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.
- » Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.
- » Use existing roads wherever possible. Where new roads are required these should be planned carefully, taking due cognisance of the local topography. All efforts should be employed to try and align roads along the landscape contours wherever possible. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
- » Keeping infrastructure at minimum heights.
- » Introducing landscaping measures such as vegetating berms.
- » Avoid the use of highly reflective material.
- » Maintain the general appearance of the site as a whole.

Lighting

- » Lighting should be kept to a minimum wherever possible.
- » Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the activity – this is especially relevant where the edge of the activity is exposed to residential properties.
- » Wherever possible, lights should be directed downwards to avoid illuminating the sky.
- » Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement.

Construction:

- » Rehabilitate all construction areas, when no longer required.
- » Keep vegetation clearing to a minimum.

Operations:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.
- » Maintain the general appearance of the facility as a whole.
- » Monitor rehabilitated areas, and implement remedial action as and when required.

Decommissioning:

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

- » Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications.
- » Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.

Residual impacts:

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

Nature of Impact:

Visual impact of construction on sensitive visual receptors in close proximity to the proposed facility

	No mitigation	Mitigation considered
Extent	High (4)	High (4)
Duration	Short term (1)	Short term (1)
Magnitude	Very High (10)	Minor (2)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	Low (15)	Negligible (7)
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation / Management:

Lighting

- » Lighting should be kept to a minimum wherever possible.
- » Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the activity – this is especially relevant where the edge of the activity is exposed to residential properties.
- » Wherever possible, lights should be directed downwards to avoid illuminating the sky.
- » Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement.

Construction:

- » Keep vegetation removal to a minimum where possible.
- » If possible keep the construction period to a minimum.
- » Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
- » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored and then disposed regularly at licensed waste facilities.
- » Employ dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- » Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.
- » Rehabilitate all disturbed areas as per the rehabilitation plan and schedule.

Decommissioning:

- » Remove infrastructure not required for the post-decommissioning use of the site.
- » Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications.
- » Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.

Residual impacts:

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

Nature of Impact: Visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed facility		
	No mitigation	Mitigation considered
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Moderate (42)	Low (20)
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: <u>Planning & operation:</u>		
<ul style="list-style-type: none"> » Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). » Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. » Make use of minimum lumen or wattage in fixtures. » Make use of down-lighters, or shielded fixtures. » Make use of Low-Pressure Sodium lighting or other types of low impact lighting. » Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. 		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

7.7.4 Implications for Project Implementation

The visual assessment of the proposed Brakpan 1 Solar Energy Facility indicates that the construction and operation of the proposed facility will have a visual effect on both the rural landscape and on sensitive receptors in the study area. The proposed infrastructure will be visible within an area that is generally characterised by low growing shrubland and wide-open undeveloped spaces. The infrastructure would thus be highly visible and impossible to hide within an area that incorporates potentially various sensitive visual receptors that may consider visual exposure to this type of infrastructure to be intrusive. The low occurrence of such sensitive visual receptors within this environment, specifically in close proximity to the proposed facility, is of relevance however, and has affected the significance rating of the anticipated visual impacts. Overall, the post mitigation significance of the visual impacts is predominately low to negligible. No visual impacts with a high residual significance are anticipated.

Notwithstanding the above, there are not many options as to the mitigation of the visual impact of the proposed infrastructure. No amount of vegetation screening or landscaping would be able to hide structures of these dimensions, especially within this receiving environment.

According to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005), the criteria that determine whether or not a visual impact constitutes a potential fatal flaw are categorised as follows:

- » Non-compliance with Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites.

- » Non-compliance with conditions of existing Records of Decision.
- » Impacts that may be evaluated to be of high significance and that are considered by the majority of the stakeholders and decision-makers to be unacceptable.

In terms of the above and to the knowledge of the specialist, the proposed development is compliant with all Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites, as well as conditions of existing Records of Decisions and no impacts of high significance have been evaluated post mitigation.

As there is the likelihood that the proposed development will be met with concern and objections from some of the affected sensitive receptors in the region, the specialist cannot categorically state that any of the above conditions were transgressed. As such the visual impacts associated with the proposed project are not considered to be fatal flaws for a development of this nature particularly due to the remote location of the study area and very low density of visual receptors. It is, therefore, suggested that the proposed Brakpan 1 Solar Energy Facility, as per the assessed layout be supported from a visual perspective, subject to the implementation of the recommended best practice mitigation measures.

7.8. Assessment of Traffic Impacts

The development of Brakpan 1 Solar Energy Facility will have an impact on traffic in the area. A detailed assessment is provided in the specialist report included in Appendix H.

7.8.1 Findings of the Traffic Assessment

The main access points for the site will be via existing Provincial gravel roads (shown in cyan in Figure 7.10). The first section is located on MR587 located between the railway crossing in Nelspoort in the west and the intersection with Divisional Road DR2396 in the east. Vehicles will then turn right onto DR2396 which leads to a poort in the south and continues along minor road OP9213 in a south-westerly direction. Vehicles will then turn right onto Minor Road OP9212 that continues to the site access road. An internal site road network will also be required to provide access to the solar field and associated infrastructure.





Figure 7.10: Proposed Main Access Road

The Client should note that application for wayleaves and permits should be made to the railway authority (Transnet) well in advance of construction commencing. Special safety measures e.g. access booms might be required to protect drivers of vehicles from oncoming railway traffic, especially in instances of poor visibility and increased traffic flow. All vertical clearances appear to be sufficient, but the height clearances need to physically be verified, especially in the vicinity of overhead power supply at the railway crossing. Should the railway authority not grant permission for the level crossing to be used during construction and operational phases, accessing the site via MR587 from Murraysburg in the east can be considered as an alternative. However, the condition of the road is unknown. There are several drainage paths and streams that cross the road along both approaches, and the condition/capacity of the existing drainage structures need to be verified. Upgrades to the existing drainage infrastructure and/or construction of new infrastructure might be required, and it is recommended that a site visit be conducted to determine the suitability thereof.

7.8.2 Description of the Traffic Impacts

The potential transport related impacts are described below.

Construction Phase

This phase includes the transportation of people, construction materials and equipment to the site. This phase also includes clearing the site and the construction of the solar facility, including construction of footings, roads, excavations, trenching, and ancillary construction works. This phase will temporarily generate the most development traffic.

Potential impacts include:

- » Construction related traffic.
- » The construction traffic would also lead to noise and dust pollution.
- » This phase also includes, in addition to the PV facility, the construction of access roads, feeder bays (inclusive of line bays, busbars, bus-section and protection equipment), insulation and assembly structures and other ancillary construction works that will temporarily generate the most traffic.

Operational Phase

This phase includes the operation and maintenance of the solar PV facility throughout its life span. During operation, it is expected that staff and security will periodically visit the facility. It is assumed that approximately 60 full-time employees will be stationed on site. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.

Cumulative Impacts

- » Traffic congestion/delays on the surrounding road network.
- » Noise and dust pollution.

7.8.3 Impact tables summarising the significance of the traffic impacts during construction, operation and decommissioning (with and without mitigation)

Nature: Construction Phase – Traffic Congestion			
Traffic congestion during the construction phase			
Impact description: The impact will occur due to added pressure on the road network due to the increase in traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period will last between 1.5 – 2 years.	Medium Negative (40)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (6)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> » Stagger component delivery to site. » The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network by reducing the construction trips and the distance travelled to transport the materials to the site. » Staff and general trips should occur outside of peak traffic periods. » Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period will last between 1.5 – 2 years.	Low Negative (24)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (4)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Residual Risks:			
Traffic will return to normal levels after construction is completed			

Nature: Construction Phase – Air Quality

Air quality will be affected by dust pollution			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period will last between 1.5 – 2 years.	Medium Negative (36)
Extent	Local (2)	Dust generation will only increase along the local gravel road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on dust generation.	
Probability	Highly Probable (4)	The possibility of the impact on the air quality is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
» Dust suppression on gravel roads during the construction phase, as required.			
» Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.			
Post Mitigation/Enhancement Measures			
Duration	Short-term (1)	The construction period will last between 1 – 1.5 years.	Low Negative (15)
Extent	Local (2)	Dust generation will only increase along the local gravel road network.	
Magnitude	Minor (2)	Dust suppression measures will result in a low occurrence of air pollution.	
Probability	Probable (3)	The possibility of air pollution is probable.	
Residual Risks:			
Traffic will return to normal levels after construction is completed.			
Dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction period.			

Nature: Construction Phase – Noise Pollution			
Noise pollution due to the increase in traffic			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period will last between 1.5 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on noise levels.	
Probability	Highly Probable (4)	The possibility of an increase in noise levels due to increased traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
» Stagger component delivery to site.			

<ul style="list-style-type: none"> » Reduce the construction period as far as possible. » The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network by reducing the construction trips and the distance travelled to transport the materials to the site. » Staff and general trips should occur outside of peak traffic periods. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (1)	The construction period will last between 1 – 1.5 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Minor (2)	The increase in traffic will have a minor impact on noise levels.	
Probability	Probable (3)	The possibility of an increase in noise levels due to increased traffic operations is a distinct possibility.	
Residual Risks:			
Traffic will return to normal levels after construction is completed.			
Noise pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise pollution is limited to the construction period.			

IMPACT TABLE – OPERATION PHASE
The traffic generated during this phase will be negligible and will not have any impact on the surrounding road network.

IMPACT TABLE – DECOMMISSIONING PHASE
This phase will have the same impact as the Construction Phase i.e., traffic congestion, air pollution and noise pollution, as similar trips/movements are expected.

7.8.4 Implications for Project Implementation

The potential traffic and transport related impacts for the construction and operation phases of the proposed Brakpan 1 Solar Energy Facility were assessed. The following was concluded:

- » The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation.
- » During operation, it is expected that maintenance and security staff will periodically visit the facility. It is assumed that approximately 60 full-time employees will be stationed on site (subject to change). The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- » The traffic generated during the decommissioning phase will be less than the construction phase traffic and the impact on the surrounding road network will also be considered negative and of medium significance before and of **low significance** after mitigation.

The potential mitigation measures recommended for the construction phase are:

- » Dust suppression
- » Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.

- » The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network by reducing the construction trips and the distance travelled to transport the materials to the site.
- » Staff and general trips should occur outside of peak traffic periods.
- » A "dry run" of the preferred route.
- » Design and maintenance of internal roads.
- » If required, any low hanging overhead lines (lower than 5.1 m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles. The construction and decommissioning phases of a development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase.

The duration of this phase is short term i.e. the impact of the traffic on the surrounding road network is temporary and a solar facility, when operational, does not add any significant traffic to the road network. Both the proposed access point and the access road to the facility are deemed feasible from a traffic engineering perspective. There is therefore no objection to the approval of the proposed project.

7.9. Assessment of Social Impacts

The development and operation of Brakpan 1 Solar Energy Facility will have an impact on social environment of the area. A detailed assessment is provided in the specialist report included in Appendix I.

7.9.1 Description of the Social Impacts

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

The positive and negative social impacts identified at this stage and will be assessed for the construction phase includes:

- » Direct and indirect employment opportunities
- » Construction workers on local communities
- » Influx of jobseekers and change in population
- » Risk to safety, livestock and damage to farm infrastructure
- » Increased risk of grass fires
- » Impacts associated with construction related activities
- » Visual impacts and sense of place impacts
- » Impacts associated with the loss of agricultural land

It is anticipated that the Brakpan 1 Solar Energy Facility will operate for approximately 20 years (which is equivalent to the operational lifespan of the project). The potential positive and negative social impacts that could arise because of the operation of the proposed project include the following:

- » The establishment of renewable energy infrastructure
- » Direct and indirect employment opportunities
- » Benefits associated with the establishment of a Community Trust
- » Visual impact and sense of place impacts
- » Potential impact on tourism

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

Construction Phase

Nature: Creation of employment and business opportunities during the construction phase		
	Without Mitigation	With Enhancement
Extent	Local – Regional (3)	Local – Regional (4)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (44)	Medium (56)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	
Enhancement:		
In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented:		
Employment		
<ul style="list-style-type: none"> • Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area. • Where feasible, efforts should be made to employ local contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Before the construction phase commences the proponent should meet with representatives from the BWM to establish the existence of a skills database for the area. If such as database exists, it should be made available to the contractors appointed for the construction phase. • The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project. • Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. 		
Business		
<ul style="list-style-type: none"> • The proponent should liaise with the BWM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work. • Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information. 		

- The BWM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

Residual impacts: Improved pool of skills and experience in the local area.

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Short term for community as a whole (2)	Short term for community as a whole (2)
Magnitude	Moderate for the community as a whole (6)	Low for community as a whole (4)
Probability	Probable (3)	Probable (3)
Significance	Medium for the community as a whole (30)	Low for the community as a whole (21)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	

Mitigation:

The potential risks associated with construction workers can be mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the Construction Phase. Aspects that should be covered include:

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- The SEP and CHSSP should include a Grievance Mechanism that enables stakeholders to report resolve incidents.
- Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories.
- The proponent should consider the option of establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local BWM Councillor for Ward 7, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers.
- The proponent and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation.
- The proponent and the contractor should implement an HIV/AIDS and COVID-19 awareness programme for all construction workers at the outset of the construction phase.
- The construction area should be fenced off before construction commences and no workers should be permitted to leave the fenced off area.
- The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contractor to effectively manage and monitor the movement of construction workers on and off the site.

- Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks.
- The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

Residual impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

Nature: Potential impacts on family structures, social networks and community services associated with the influx of job seekers

	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Permanent (5) (For job seekers that stay on the town)	Permanent (5) (For job seekers that stay on the town)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (24)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	

Mitigation:

It is impossible to stop people from coming to the area in search of a job. However, as indicated above, the proponent should ensure that the employment criteria favour local residents in the area. In addition:

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- The proponent, in consultation with the BWM, should investigate the option of establishing a MF to monitor and identify potential problems that may arise due to the influx of job seekers to the area. The MF should also include the other proponents of solar energy projects in the area.
- The proponent should implement a "locals first" policy, specifically with regard to unskilled and low skilled opportunities.
- The proponent should implement a policy that no employment will be available at the gate.

Residual impacts:

Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

Nature: Potential risk to safety of scholars, farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site		
	Without Mitigation	With Mitigation
Extent	Local (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area. The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. Traffic and activities should be strictly contained within designated areas. Strict traffic speed limits must be enforced on the farm. All farm gates must be closed after passing through. Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties. The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site. The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors', and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below). The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested. Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. It is recommended that no construction workers, with the exception of security personnel, should be 		

permitted to stay over-night on the site.
Residual impacts: No, provided losses are compensated for.

Nature: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires		
	Without Mitigation	With Mitigation
Extent	Local (4)	Local (2)
Duration	Short term (2)	short term (2)
Magnitude	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock and crop losses etc.	Yes, compensation paid for stock and crop losses etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
- The option of establishing a fire-break around the perimeter of the site prior to the commencement of the construction phase should be investigated.
- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas.
- Smoking on site should be confined to designated areas.
- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are effectively managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months.
- Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle.
- Contractor to provide fire-fighting training to selected construction staff. No construction staff, with the exception of security staff, to be accommodated on site overnight.
- As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.

Residual impacts: No, provided losses are compensated for.
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Nature: Potential noise, dust and safety impacts associated with construction activities and movement of traffic to and from the site		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)

Duration	Short Term (2)	Short Term (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Low (15)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include:

- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- As far as possible, the transport of components to the site along the N1, N12 and R61 should be planned to avoid weekends and holiday periods.
- The contractor should inform local farmers and representatives from the BWM and relevant provincial road authorities of dates and times when abnormal loads will be undertaken.
- The contractor must ensure that damage caused by construction related traffic to the gravel public roads and local, internal farm roads is repaired on a regular basis throughout the construction phase. The costs associated with the repair must be borne by the contractor.
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis, adhering to speed limits and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- All vehicles must be roadworthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.
- The Contractor should ensure that workers are informed that no waste can be thrown out of the windows while being transported to and from the site. Workers who throw waste out windows should be fined.
- The Contractor should be required to collect waste along access roads on a weekly basis.
- Waste generated during the construction phase should be transported to the local permitted landfill site.
- EMPr measures (and penalties) should be implemented to ensure farm gates are closed at all times.
- EMPr measures (and penalties) should be implemented to ensure speed limits are adhered to at all times.

Residual impacts:

If damage to local farm roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were not responsible for the damage.

Nature: The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the SEF will damage farmlands and result in a loss of farmlands for grazing.

	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Highly Probable (4)
Significance	Medium (36)	Low (20)
Status	Negative	Negative

Reversibility	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
Irreplaceable loss of resources?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
Can impact be mitigated?	Yes, however, loss of farmland cannot be avoided	
<p>Mitigation: The potential impacts associated with damage to, and loss of farmland can be effectively mitigated. The aspects that should be covered include:</p> <ul style="list-style-type: none"> • The site for the proposed SEF should be fenced off prior to commencement of construction activities. • The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised. • An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase. • All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase. • The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up by the Environmental Consultants appointed to manage the EIA. • The implementation of the Rehabilitation Programme should be monitored by the ECO. 		
<p>Residual impacts: Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.</p>		

Operation Phase

Nature: Development of infrastructure to generate clean, renewable energy		
	Without Mitigation	With Mitigation
Extent	Local, Regional and National (4)	Local, Regional and National (5)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly Probable (4)	Definite (5)
Significance	High (64)	High (85)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	Reduced CO ₂ emissions and impact on climate change
Can impact be mitigated?	Yes	
<p>Enhancement: Should the project be approved the proponent should:</p> <ul style="list-style-type: none"> • Implement a skills development and training programme aimed at maximising the number of employment opportunities for local community members. • Maximise opportunities for local content, procurement, and community shareholding. 		
<p>Residual impacts: Overall reduction in CO₂ emission, reduction in water consumption for energy generation, contribution to establishing an economically viable commercial renewables generation sector in the Northern Cape and South Africa.</p>		

Nature: Creation of employment and business opportunities associated with the operational phase		
	Without Mitigation	With Enhancement

Extent	Local and Regional (1)	Local and Regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Definite (5)
Significance	Low (27)	Medium (50)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement: The enhancement measures to enhance local employment and business opportunities during the construction phase, also apply to the operational phase.		
Residual impacts: Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area		

Nature: Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development		
	Without Mitigation	With Enhancement⁹
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Significance	Medium (30)	High (65)
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
Enhancement: In order to maximise the benefits and minimise the potential for corruption and misappropriation of funds the following measures should be implemented:		
<ul style="list-style-type: none"> • The BWM should liaise with the proponents of other renewable energy projects in the area to investigate how best the Community Trusts can be established and managed so as to promote and support local, socio-economic development in the region as a whole. • The BWM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the BWM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager. • Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. • Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the SEF plant. 		
Residual impacts: Promotion of social and economic development and improvement in the overall well-being of the community		

⁹ Enhancement assumes effective management of the community trust

Nature: The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc.		
	Without Mitigation	With Enhancement
Extent	Local (1)	Local (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Significance	Low (27)	Medium (53)
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
Enhancement: Implement agreements with affected landowner.		
Residual impacts: Support for local agricultural sector and farming		

Nature: Visual impact associated with the proposed solar facility and the potential impact on the area's rural sense of place and adjacent land uses.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (27)
Status	Negative	Negative
Reversibility	Yes, solar facility can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: The recommendations contained in the Final VIA should also be implemented.		
Residual impacts: Potential impact on current rural sense of place.		

Nature: Potential impact of the SEF on local tourism operations and visitors. The impact will be linked to the potential visual impacts and the perception of people visiting the area.		
	Without Mitigation	With Enhancement / Mitigation
Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Low (24)
Status	Negative	Negative
Reversibility	Yes, solar facility can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Enhancement: The recommendations contained in the Final VIA should be implemented.		
Residual impacts:		

Potential impact on current rural sense of place.

Decommissioning Phase

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post-commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the job losses typically associated with decommissioning.

Given the relatively small number of people employed during the operational phase (~ 20), the social impacts at a community level associated with decommissioning will be limited. In addition, potential impacts associated with the decommissioning phase can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

The key social issues associated with the decommissioning phase are the following:

Nature: Social impacts associated with retrenchment including loss of jobs, and source of income		
	Without Mitigation	With Mitigation
Extent	Local and regional (2)	Local and regional (1)
Duration	Medium Term (2)	Very Short Term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (40)	Low (24)
Status	Negative	Negative
Reversibility	Yes, assumes retrenchment packages are paid to all affected employees	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation:		
The following mitigation measures are recommended:		
<ul style="list-style-type: none"> The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned. All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning. Revenue generated from the sale of scrap metal during decommissioning should be allocated to funding closure and rehabilitation of disturbed areas. 		
Residual impacts:		
Loss of jobs and associated loss of income etc. can impact on the local economy and other businesses. However, decommissioning can also create short term, temporary employment opportunities associated with dismantling etc.		

7.9.3 Implication for Project Implementation

The findings of the SIA indicate that the development of the proposed 190 MW Brakpan 1 PV SEF and associated infrastructure will create employment and business opportunities for locals in the BWM during both the construction and operational phase of the project.

The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. The significance of this impact is rated as **High Positive**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure. The establishment of the proposed 190 MW Brakpan 1 PV SEF and associated infrastructure including a BESS is therefore supported by the findings of the SIA.

Recommendations

The enhancement and mitigation measures outlined in the SIA and other key specialist reports should be implemented.

7.10 Implications for Project Implementation Related to the Storage and Handling of Dangerous Goods

During the construction and operation phase, the Brakpan 1 Solar Energy Facility will require the storage of materials which may be considered to be dangerous goods.

"Dangerous goods" is defined under the Listing Notices that deal with the storage, or storage and handling, of dangerous goods. "Dangerous goods" are defined in the Listing Notices as:

"Goods containing any of the substances as contemplated in South African National Standard No. 10234, supplement 2008 1.00: designated "List of classification and labelling of chemicals in accordance with the Globally Harmonized Systems (GHS)" published by Standards South Africa, and where the presence of such goods, regardless of quantity, in a blend or mixture, causes such blend or mixture to have one or more of the characteristics listed in the Hazard Statements in section 4.2.3, namely physical hazards, health hazards or environmental hazards".

The above definition makes specific reference to SANS 10234. South Africa has implemented the Globally Harmonized System of Classification and Labelling of Chemicals by issuing this national standard.

7.10.1 Risks associated with Battery Energy Storage

A Battery Energy Storage Systems (BESS) comprising a solid-state battery system will allow for energy storage for an extended period (of up to 4 hours). The general purpose and utilisation of the BESS will be to save and store excess electrical output from the facility as it is generated, allowing for a timed release to the national grid when the capacity is required. The BESS will be contained within insulated containers and will connect to the on-site facility substation via underground cabling. **Figure 7.11** provides a general illustration of a BESS.



Figure 7.11 Example of battery storage units integrated as part of PV array (Source: nexttracker.com)

The risks associated with battery technologies are generally well understood and researched. The primary risks relate to fire hazards and the potential for a condition known as ‘thermal runaway’. Thermal runaway occurs in situations where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result. The risks detailed in the table below considers only the risks associated with on-site use of battery energy storage systems for PV facilities.

Possible risks associated with the construction and operation of the BESS from a technical perspective within the development footprint of the Brakpan 1 Solar Energy facility are limited to health and safety aspects during the project life cycle of the BESS as well as the solar energy facility. The risks identified for the construction and operation of the BESS are detailed below. Mitigation measures have been included within the project EMPr (**refer to Appendix L**).

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
<p>1. <u>Mechanical breakdown/ Exposure to high temperatures</u></p> <p>» Incidents where the batteries are broken or exposed to temperature above room temperature could lead to overheating as well as fires which can affect infrastructure components of the BESS.</p> <p>» Leakages of substances contained within the battery cells (should they not be assembled off-site).</p>	<p>Low</p>	<p>» Fires, electrocutions and spillage of toxic substances into the surrounding environment.</p> <p>» Spillage of hazardous substances into the surrounding environment.</p> <p>» Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas.</p> <p>» Water Pollution – spillages into groundwater.</p> <p>» Health impacts – on the surrounding communities, particularly those relying on groundwater as a primary source of water.</p>	<p>Operators are trained and competent to operate the BESS. Training should include the discussion of the following:</p> <ul style="list-style-type: none"> * Potential impact of electrolyte spills on groundwater; * Suitable disposal of waste and effluent; * Key measures in the EMPr relevant to worker's activities; * How incidents and suggestions for improvement can be reported. <p>» Training records should be kept on file and be made available during audits.</p> <p>» Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times.</p> <p>» Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times.</p> <p>» Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.).</p> <p>» Firefighting equipment should readily be available at the BESS area and within the site.</p> <p>» Maintain strict access control to the BESS area.</p> <p>» Ensure all maintenance contractors / staff are familiar with the supplier's specifications.</p> <p>» Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these.</p> <p>» Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices.</p> <p>» Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment.</p>

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
			<ul style="list-style-type: none"> » The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed. » Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. » The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS. » Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS.
<p>2. <u>Generation of hazardous waste</u></p> <p>» The incorrect disposal of the batteries and the associated components could have an adverse impact on the environment.</p>	Medium	<ul style="list-style-type: none"> » Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from the disposed batteries into the soil, which could lead to an impact of the productivity of soil forms in affected areas. » Water pollution – leachate from the disposed batteries spilling into groundwater. » Health impacts – on the surrounding communities, particularly those relying on groundwater as a primary source of water. 	<ul style="list-style-type: none"> » Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. » The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.

7.11. Assessment of the 'Do Nothing' Alternative

The do-nothing' alternative (i.e. no-go alternative) is the option of not constructing Brakpan 1 Solar Energy facility. 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

The most sensitive soil forms that can be expected for the area include the Hutton and Oakleaf soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low to Moderate" sensitivities, which correlates with the requirements for a compliance statement only.

The available climate can limit crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area. The area is not favourable for most cropping practices.

It is worth noting that, additional baseline soil field assessments can provide for a better understanding of the soil or land potentials for the project area. It is the specialist's opinion that the proposed solar renewable energy project based on the DAFF (2017) land capability sensitivity of the area will have limited impact on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed solar renewable energy project development may be favourably considered.

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 Beaufort West and Nelspoort area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- » The agricultural potential of the 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 alternative land use as a result of the solar resource availability over the area. Should the no-go option be considered, land-use would be restricted to the current land use (i.e. grazing).
- » The main and current land use of the project site is the undertaking of grazing activities to a limited extent, which is not considered to be an effective land use and offers limited benefit and income to the landowners. The 'do nothing' alternative would result in a lost opportunity for the landowner (in terms of implementing a compatible alternative land use option, while still retaining the current land use, as well as a loss in long-term revenue).
- » Negative impacts would be associated with 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 project 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 DMRE 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.

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 Nelspoort, 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: Brakpan 1 Solar Energy facility is likely to create approximately 150 (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 Brakpan 1 Solar Energy facility 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 Brakpan 1 Solar Energy facility 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

Western 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 Brakpan 1 Solar Energy facility 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

At a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. Although the Brakpan 1 Solar Energy Facility is only proposed to contribute a contracted capacity of up to 190MW to the grid capacity, this would assist in meeting the electricity demand for the relevant private off-takers 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) (2019) provides for the development of 6 000MW of capacity from large-scale solar energy facilities by 2030. 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 Mineral Resources and Energy. However, as the surrounding area experiences ample solar resource, not developing Brakpan 1 Solar Energy Facility would see such an opportunity being lost. As current land use activities can continue on the study area once the project is operational, the loss of the land to this project during the operation phase (equivalent to ~2,3% of the larger project site) is not considered significant. In addition, the Western 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 Brakpan 1 Solar Energy Facility. 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 Brakpan 1 Solar Energy Facility.

CHAPTER 8: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 7, a solar PV facility may have impacts (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 Brakpan 1 Solar Energy facility largely in isolation (from other similar developments).

As previously stated in this report, the Brakpan 1 Solar Energy Facility study area and development area is located within the Beaufort West REDZ (REDZ 11). The REDZ areas are zones identified by the DFFE as:

1. geographical areas of strategic importance for the development of large-scale solar photovoltaic and wind energy development activities; and
2. 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.

Prominent renewable energy features and infrastructure has been introduced in the broader area around the Brakpan 1 Solar Energy Facility site. Therefore, the development of Brakpan 1 Solar Energy Facility 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, as anticipated in the legislation of REDZ.

The Department of Mineral Resources and Energy ("DMRE"), under the Renewable Independent Power Producer ("REIPP") Procurement 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 REIPP Procurement Programme has been rolled out in bidding 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. To date, RFPs for five (5) bidding windows have been successfully issued and awarded by the DMRE. Similar programmes could be released in future by government and private off-takers in accordance with the ever-changing policy framework for energy generation in the country.

As a result of the REIPP Procurement Programme and the promulgation of the REDZ zones, there has been a substantial increase in interest in solar PV facility developments in South Africa, with 23 PV facilities currently operational (Energyblog¹⁰, 2020). It is, therefore, important to follow a precautionary approach in accordance with National Environmental Management Act ("NEMA") to ensure that the potential for cumulative impacts¹¹ is considered and avoided to an extent possible.

This chapter assesses the potential for the impacts associated with Brakpan 1 Solar Energy Facility to become more significant when considered in combination with the other known or proposed solar facility projects within the area.

¹⁰ https://www.energy.org.za/data-and-tools/project-database?art_title=&programme=&project_type=Solar+Photovoltaic+%28PV%29&province=Northern+Cape&status=Fully+operational&cck=project&scale=Large+Scale+Utility&country=South+Africa&search=project_search&task=search

¹¹ 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.

8.1 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 Brakpan 1 Solar Energy Facility are included and assessed within this chapter.

8.2 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 in this area south-east of Beaufort West 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 nesting areas.
- » Unacceptable loss of heritage resources (including palaeontological and archaeological resources and impacts on cultural landscape).
- » Complete or whole-scale change in the sense of place and character of an area and unacceptable visual intrusion.
- » Unacceptable impact to social factors and components.
- » Traffic impacts relating to increased road in the area.

The role of the cumulative assessment is to determine and confirm if such impacts are relevant to Brakpan 1 Solar Energy Facility within the 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 does 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, in accordance with the requirements of the DFFE.

Figure 8.1 indicates the location of Brakpan 1 Solar Energy Facility in relation to all other known and viable (i.e., projects with a valid Environmental Authorisation) solar PV facilities located within a radius of 30km from the development area under assessment. These projects were identified using the DFFE Renewable Energy Database and current knowledge of projects being proposed, operational and developed in the area. In the case of Brakpan 1 Solar Energy Facility, there is only one other authorised solar PV facility within a 30km radius of the development area (refer to **Figure 8.1** and **Table 8.1**). Renewable energy facilities within a 30

km radius include those part of the Poortjie Wes Cluster all at various stages of approval¹². The location of Brakpan 1 Solar Energy Facility and Belvedere Solar Energy Facility which form part of the Poortjie Wes Cluster are still to be confirmed following further screening studies and technical investigations; however these two facilities will be located within a 30km radius of Brakpan 1 Solar Energy Facility and the indicative location is provided in Figure 8.1.

The potential for cumulative impacts is summarised in the sections that follow and has been considered within the specialist studies (refer to **Appendices D – I**).

Table 8.1: Solar facilities located within the surrounding area (within a 50km radius) of the Brakpan 1 Solar Energy facility development area

Project Name	DFFE Ref. No	Location	Project Status
75MW Beaufort West Photovoltaic (PV) Project	14/12/16/3/3/1/2332	46km southwest	Authorised
Belvedere Solar Energy facility	TBA	To be confirmed	In Process
Brakpan 2 Solar Energy facility	TBA	To be confirmed	In Process
Montana 1 Solar Energy facility	TBA	27km west	In Process
Montana 2 Solar Energy facility	TBA	12km northwest	In Process
Montana 3 Solar Energy facility	TBA	11km west	In Process

It should be noted that NOT all the solar facilities (PV and CSP) presently under consideration by various solar energy developers will become operational. Not all proposed developments will be granted the relevant permits by the relevant authorities (DFFE, DMRE, NERSA and Eskom) due to either of the following reasons:

- » Grid capacity constraints - there may be limitations to the capacity of the existing or future Eskom grid.
- » Authorisation - not all applications will receive a positive environmental authorisation.
- » Competitive landscape – there are stringent requirements to be met by applicants in terms of the REIPP Procurement Programme or similar programme and a highly bidding competitive process where the most competitive projects are selected.
- » Negative impacts - 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).
- » Additional Permits and Licences - not all proposed facilities will eventually be granted a generation license by NERSA and/or sign a Power Purchase Agreement (“PPA”) with Eskom.
- » Funding - 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 PV and CSP facilities in the surrounding area and Brakpan 1 Solar Energy facility are therefore qualitatively assessed in this Chapter.

¹² Applications for Environmental authorisation for other wind and 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.

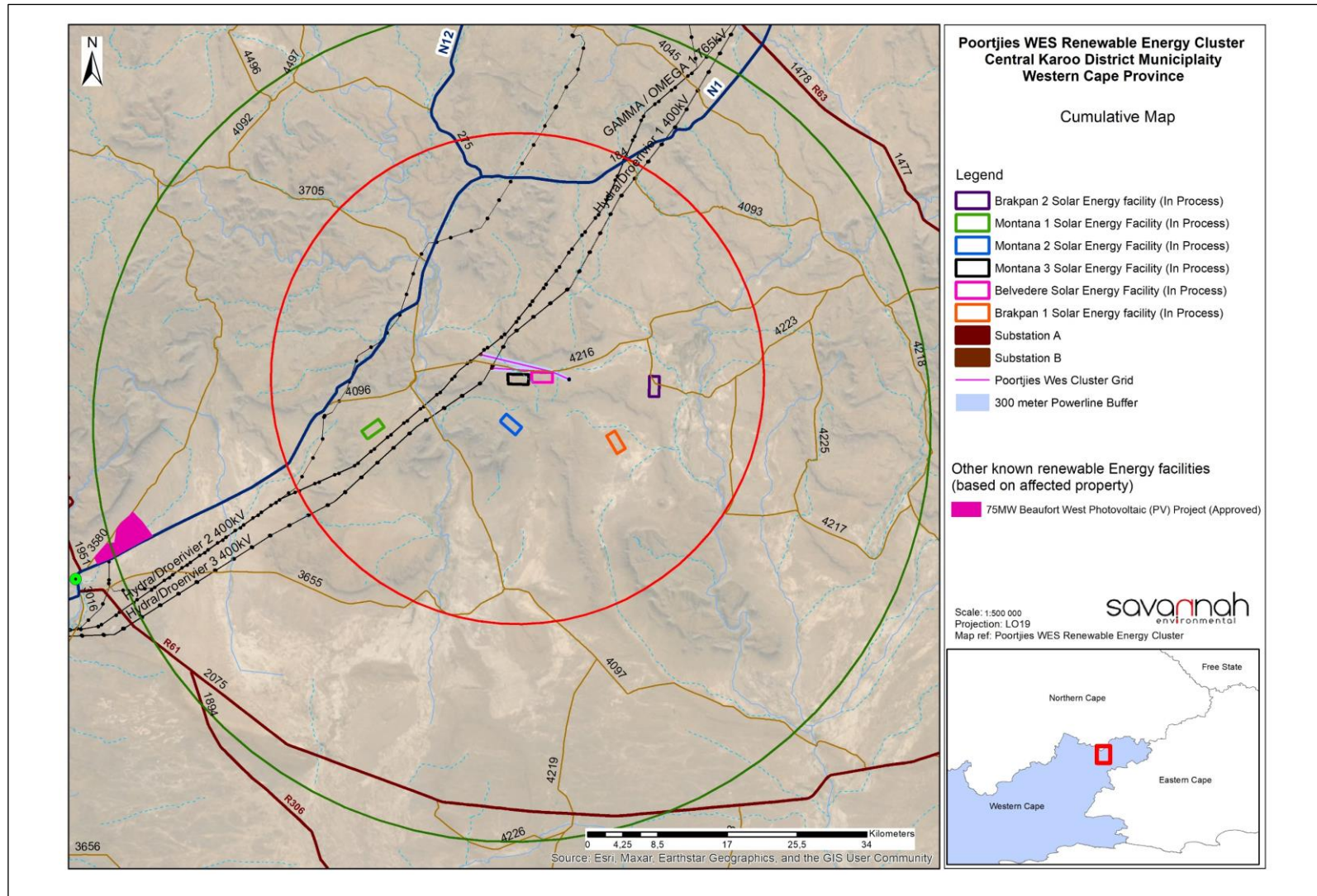


Figure 8.1: Identified solar facility projects (including PV and CSP) located within a 50km radius of the Brakpan 1 Solar Energy facility development area that are considered as part of the cumulative impact assessment

The following potential impacts are considered (refer to Appendix D – I for more details):

- » Cumulative impacts on ecological processes (including fauna and flora)
- » Cumulative impacts on avifauna
- » Cumulative impacts on heritage resources (including archaeology and palaeontology)
- » Cumulative visual impacts
- » Cumulative social impacts
- » Cumulative traffic impacts

8.3 Cumulative Impacts on Ecological Processes

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system.

This section describes the cumulative potential impacts of the project on biodiversity. Cumulative impacts are assessed in context of the extent of the proposed development area, other developments in the area, as well as general habitat loss and transformation resulting from other activities in the area.

Presently, the surrounding immediate and broader landscape consists of natural vegetation used for supporting livestock (mostly sheep) and to a lesser extent game. The Phase 1 and Phase 2 REDZs spatial files and the South African Renewable Energy EIA Application Database (DFFEb, 2021) was overlaid onto the Gamka Karoo remnants layer. The remnants layer was released as part of the NBA (Skowno *et al*, 2019) and provides the present spatial extent of vegetation. The South African Renewable Energy EIA Application Database contains spatial data for renewable energy applications for environmental authorisation. It includes spatial and attribute information for both active (in process and with valid authorisations) and non-active (lapsed or replaced by amendments) applications. Data is captured and managed on a parcels level as well as aggregated to the project level at the boundary level. Considering the limited extent of approved and in process developments within the Gamka Karoo (Figure 8.2), the expected cumulative impact is expected to be of a 'Medium' significance.

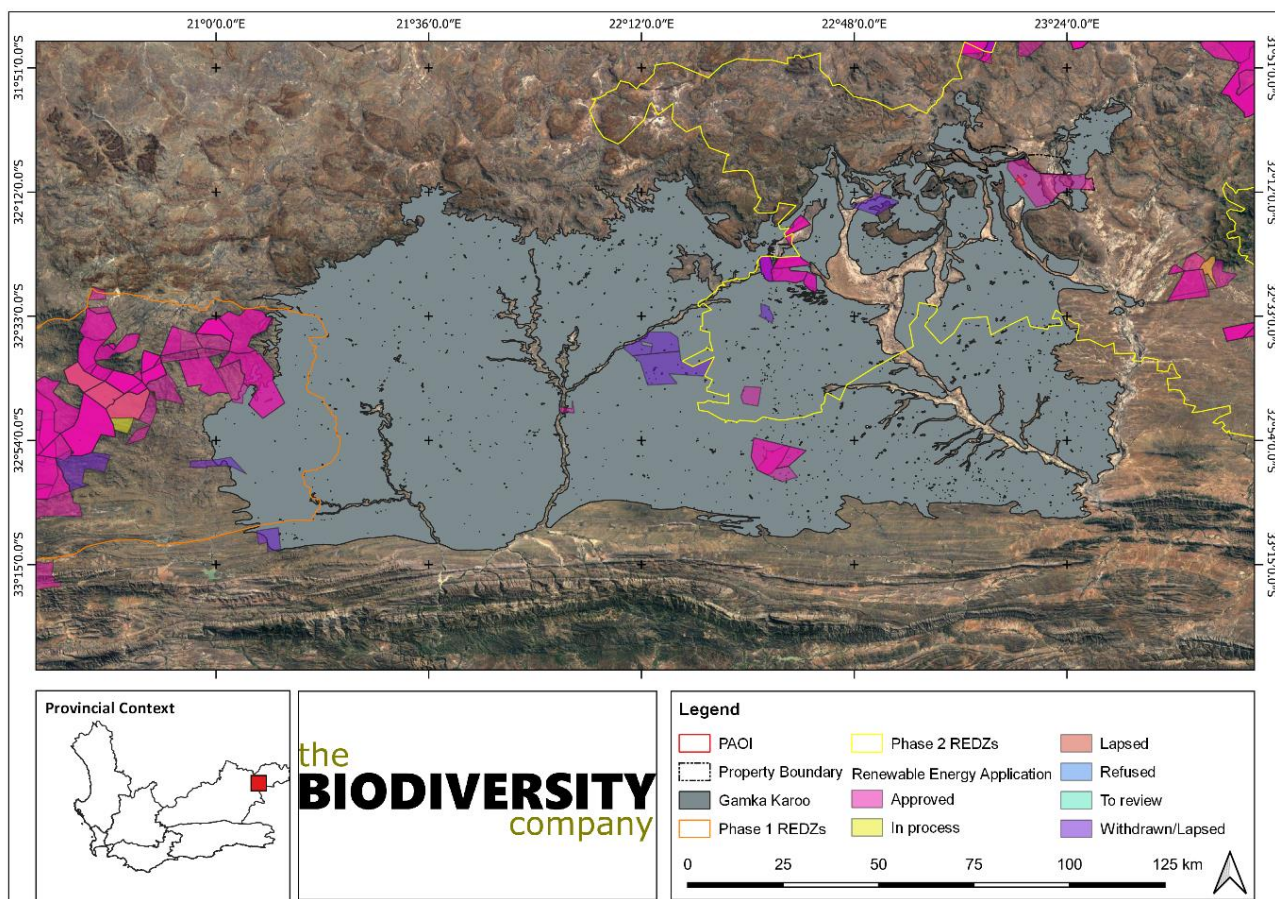


Figure 8.2: Map illustrating additional renewable energy developments within the Gamka Karoo vegetation type

Impact Nature: Cumulative habitat loss within the region		
The development of the proposed Brakpan 1 Solar Energy Facility will contribute to cumulative habitat loss within the Gamka Karoo, Other Natural Areas and Ecological Support Areas		
	Overall impact of the proposed development considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Very low (1)	Low (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium	Medium
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	Yes, in certain cases
Can impacts be mitigated	Yes, to some degree. However, should the entirety of the REDZ areas be developed, the cumulative impacts on the receiving environment will be regarded as 'High'.	
Mitigation:		
Ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented. Set-aside areas (Avoidance areas) should be established in order to conserve natural habitats where possible.		

8.4 Cumulative Impacts on Avifauna

The cumulative impact assessment includes the position and number of existing transmission infrastructure and impacts present across the receiving environment considering the scenario where all the renewable energy components proposed in the cluster are approved and constructed following appropriate mitigation measures.

For solar energy developments the highest potential cumulative impacts following the implementation of mitigation measures relate to the direct destruction of habitat (primarily during the construction phase). Collisions with the solar PV array pose a lower risk to large-bodied SCC than overhead transmission lines and the grid connection infrastructure associated with the proposed development will be separately assessed and the impacts appropriately mitigated against to reduce the likelihood of collisions occurring. The position of the proposed infrastructure in close proximity to existing transmission lines reduces the length of grid connection required and is therefore unlikely to increase the risk associated with overhead power lines in the area beyond that already present across the landscape.

It is unlikely that the proposed development will result in a significant contribution to the cumulative impact or negatively influence the long-term viability or persistence of avifaunal populations in the area given the high availability of suitable habitat for SCCs surrounding the site.

Nature:		
The primary impact associated with solar PV facilities on the avifaunal community of the receiving environment is the loss of available habitat associated with the clearing of vegetation for the solar arrays and the indirect loss of habitat due to disturbance and displacement associated with ongoing activity. Habitat cleared for the construction of permanent facilities will not be available for use by avifaunal species during the operational lifespan of the development. This impact is unavoidable, however, it is unlikely to contribute to a significant reduction in the long-term persistence or viability of avifaunal SCCs in the area either individually or cumulatively.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Low (1)	Low (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (1)	Minor (1)
Probability	Definite (5)	Definite (5)
Significance	Medium (30)	Medium (30)
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation:		
Mitigation as recommended for all solar projects in the area must be implemented.		

8.5 Cumulative Impacts on Heritage Resources (including archaeology, palaeontology and cultural landscape)

There is the potential for the cumulative impact of proposed renewable energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. This project falls within a REDZ area, and it is preferable to have renewable energy facility development clustered in an area such as a REDZ.

To address concerns about the cumulative impact of RE facilities within the greater Karoo region, a cautious approach is required in terms of assessing the desirability of such development from a cultural landscape perspective. The placement of PV facilities must take cognisance of the very high visual impact on a relatively intact and representative cultural landscape, and the extremely limited ability to visually screen this infrastructural development. For this particular project, the findings of the VIA are that "Overall, the post mitigation significance of the visual impacts is predominately **low to negligible**. No visual impacts with a high residual significance are anticipated."

NATURE: Cumulative Impact to the sense of place		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Magnitude	Low (4)	Low (4)
Duration	Medium-term (3)	Long-term (4)
Extent	Low (1)	Low (1)
Probability	Improbable (2)	Probable (3)
Significance	Low (16)	Low (27)
Status	Neutral	Neutral
Reversibility	High	Low
Irreplaceable Loss of Resources?	Unlikely	Unlikely
Can Impacts be Mitigated	Not required	Not required
Confidence In Findings: High		
Mitigation: Low impacts are anticipated and as such, no mitigation is required		

8.6 Cumulative Visual Impacts

The Brakpan 1 Solar Energy Facility addressed in this report is only one component of a larger solar cluster consisting of up to 6 different facilities known as the Poortjie Wes Cluster, within the greater area. The Cluster entails the development of six (6) solar energy facilities with a generation capacity of between 140-220 MWac each (with a height of 4m). All six (6) renewable energy ("RE") facilities will connect to the proposed 132kV Belvedere Collector Switching Station (the "Collector Switching Station") via 132kV Overhead Lines ("OHLs") or directly to the new Poortjie Wes 400/132kV LILO MTS. The proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILO substation ("Poortjie Wes LILO MTS") via a 132kV OHL. As the concept layouts of these facilities are known, the potential cumulative visual exposure of the entire proposed Poortjie Wes Cluster was investigated.

Figure 8.3 illustrates the anticipated cumulative visual impact of the Poortjie Wes Cluster and specifically the anticipated frequency of visual exposure. Areas shaded orange/yellow are likely to be exposed to 4 or 5 of the

facilities, areas shaded in green are likely to be exposed to two of the facilities, while areas shaded in blue are likely to be exposed to only one of the facilities.

Majority of the study area and sensitive visual receptors will only be exposed to a single facility, with scattered areas to the north, northwest, northeast and south being exposed to 2-5 facilities.

Areas experiencing a moderate cumulative exposure (2-5 facilities) include high lying areas such as Voorberg, Blinkfontein se Berg, Gifkop, Salberg, Katjiesberg and Luiperdskop. However, it is important to note that no visual receptors within these areas and as such, the magnitude of the visual impact will be greatly reduced.

Sensitive visual receptors predicted to experience a low cumulative exposure (1-2 facilities) include Kombrinkskuil, Hamelkuil, residents of homesteads/dwellings and observers using the secondary roads.

No areas of high cumulative visual exposure are anticipated.

The proposed Poortjie Wes Cluster, although in line with current development and land use trends in the region, will certainly contribute to the increased cumulative visual impact of solar energy facilities.

Nature of Impact: The potential cumulative visual impact of the facility on the visual quality of the landscape.		
	Overall impact of the project considered in isolation (with mitigation)	Cumulative impact of the project and other projects within the area (with mitigation)
Extent	Very short distance (4)	Medium to longer distance (2)
Duration	Long (4)	Long (4)
Magnitude	High (8)	High (8)
Probability	Improbable (2)	Probable (3)
Significance	Moderate (32)	Moderate (42)
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation / Management:		
<u>Planning:</u>		
➤ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.		
<u>Operations:</u>		
➤ Maintain the general appearance of the servitude as a whole.		
<u>Decommissioning:</u>		
➤ Remove infrastructure not required for the post-decommissioning use.		
➤ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts:		
The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain. The Projects submitted under the REIPP Procurement Programme are required to submit a Decommissioning Plan; as such the facility will be decommissioned when it reaches its end of life.		

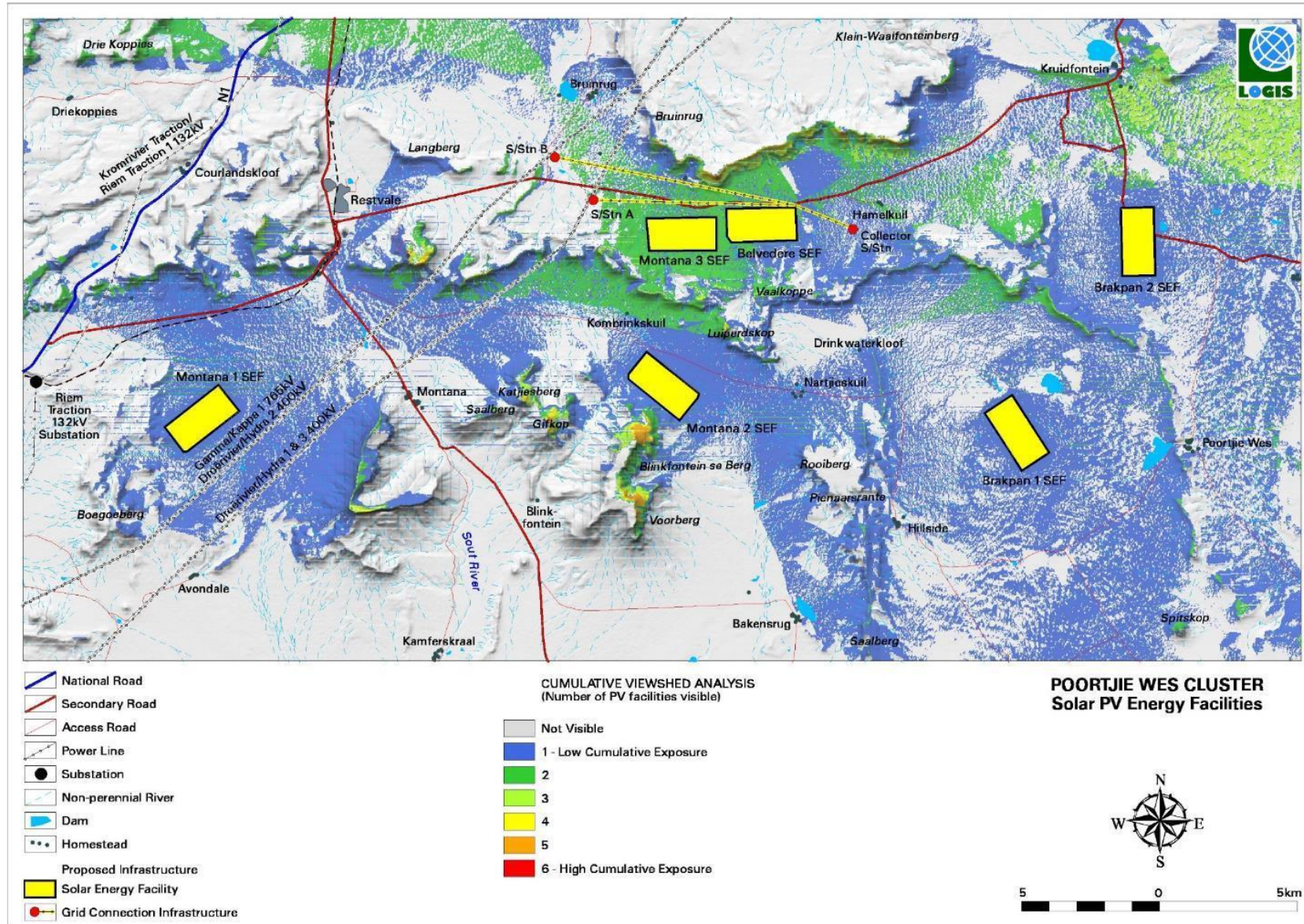


Figure 8.3: Potential Cumulative Visual Exposure for the Poortjie Wes Cluster

8.7 Cumulative Social Impacts

The Poortjie Wes Cluster involves the establishment of six solar facilities. The potential for cumulative impacts associated with combined visibility (whether two or more solar facilities will be visible from one location) and sequential visibility (e.g., the effect of seeing two or more solar facilities along a single journey therefore exists). The significance of the impact is rated as **Medium Negative**. However, the proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure.

Cumulative impact on services

The establishment of the proposed Solar Energy Facility ("SEF") and the other REFs in the Beaufort West Municipality ("BWM") may place pressure on local services, specifically medical, education and accommodation. This pressure will be associated with the potential influx of workers to the area associated with the construction and operational phases of renewable energy projects proposed in the area, including the proposed SEF. The potential impact on local services will be mitigated by to an extent possible employing local community members. With effective mitigation the impact is rated as **Medium Negative**.

In addition, as indicated below, this impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of renewable energy as an economic driver in the area. The REIPP Procurement Programme requires that labour for the construction and operational phase of the SEFs to an extent possible be sourced within 50km radius of the project site.

Cumulative impact on local economies

In addition to the potential negative impacts, the establishment of the proposed SEF and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the BWM, which, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities. The REIPP Procurement Programme requires that Projects set up Community Trusts for the benefit of communities within 50km radius of the project site. The Community Trust associated with each project will also create significant socio-economic benefits. These benefits should also be viewed within the context of the limited economic opportunities in the area and the impact of the decline in the mining sector in recent years. This benefit is rated as **High Positive** with enhancement.

Nature: Cumulative impacts on sense of place and the landscape		
Visual impacts associated with the establishment of more than one SEF and the potential impact on the area's rural sense of place and character of the 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 and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Medium (30)
Status (positive/negative)	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	

Loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Mitigation: The recommendations of the VIA should be implemented.		

Nature: Cumulative impacts on local services		
The establishment of a number of renewable energy facilities in the BWM has the potential to place pressure on local services, specifically medical, education and accommodation		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Medium (30)
Status (positive/negative)	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: The Western Cape Provincial Government, in consultation with the BWM and the proponents involved in the development of renewable energy projects in the BWM, should consider establishing a Development Forum to co-ordinate and manage the development and operation of renewable energy projects in the area with the specific aim of mitigating potential negative impacts and enhancing opportunities. This would include identifying key needs, including capacity of existing services, accommodation and housing and the implementation of an accredited training and skills development programmes aimed at maximising the opportunities for local workers to be employed during the construction and operational phases of the various proposed projects. These issues should be addressed in the Integrated Development Planning process undertaken by the BWM.		

Nature: Cumulative impacts on local economy		
The establishment of a number of solar energy facilities in the BWM will create employment, skills development and training opportunities, creation of downstream business opportunities.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Low (27)	High (60)
Status (positive/negative)	Positive	Positive
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Loss of resources?	No	No

Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Enhancement: The proposed establishment of suitably sited renewable energy facilities within the BWM should be supported.		

8.9 Cumulative Traffic Impacts

To assess the cumulative impact, it was assumed that all proposed and authorised renewable energy projects within 30 km will be constructed at the same time. This is a precautionary approach, as in reality these projects would be subject to a highly competitive bidding process, and only a few projects are awarded within each bidding window. Only a handful of projects would be selected to enter into a PPA with Eskom, and construction is likely to be staggered depending on project-specific issues.

According to the Department of Forestry, Fisheries and Environment ("DFFE")'s database there is one (1) other authorised renewable energy facility within a 30km radius of the proposed study area.

It is however unclear whether other projects not related to renewable energy have been constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture. As the project site is located in a REDZ, it is possible that future solar farms maybe developed within the general area.

The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network).

Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

The assessments of cumulative impacts are collated in the table below.

Nature: Cumulative Impact - Traffic generated by the proposed development and the associated noise and dust pollution.		
	Overall impact of the proposed project considered in isolation (post mitigation)	Cumulative impact of the project and other projects in the area
Extent	Low (2)	High (5)
Duration	Short (1)	Medium-term (3)
Magnitude	Minor (2)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	Low (15)	Medium (32)
Status (positive/negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

- » Stagger component delivery to site.
- » Dust suppression.
- » Reduce the construction period.
- » The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network by reducing the construction trips and the distance travelled to transport the materials to the site.
- » Staff and general trips should occur outside of peak traffic periods.

Residual Impacts:

- » Minimal increase in traffic during the operational phase on local roads.
- » Decrease in air quality due to dust generation during construction phase only.
- » Increase in noise levels only during the construction phase.

8.10 Contribution of the Project to Climate Change Mitigation

South Africa is a country with an economy dependent on coal for the majority of its electricity, an energy-intensive industrial sector, and an energy sector responsible for 82% of total GHG emissions, making it the 12th highest world emitter of GHG¹³. The Energy sector is the largest contributor (80.1% in 2017) to emissions and is responsible for 96.6% of the increase over the 17-year period from 2000 to 2017¹⁴.

It has been reported internationally that the move towards renewable energy for electricity generation needs has resulted in decreased greenhouse gas emissions. The International Energy Agency ("IEA") announced in March 2015 that 2014 carbon dioxide emissions from the energy sector levelled off for the first time in 40 years. This has happened without being linked to an economic downturn. This was attributed to the increase in the use of renewable energy sources by China and Economic Co-operation and Development ("OECD") countries¹⁵. As GHG emissions associated with the provision of energy services are a major cause of climate change, this move to renewable energy and subsequent reduction in CO₂ emissions is considered as a positive contribution towards climate change mitigation.

The South African Government recognises the need to diversify the mix of energy generation technologies within the country and to reduce the country's reliance on fossil fuels which contribute towards climate change and are therefore not environmentally friendly. This is in accordance with the prescriptions of the United Nations Convention on Climate Change 1994 ("UNFCCC") and its associated Kyoto protocol of 1997.

Consequently, the South African Government made a commitment to move towards cleaner energy as part of the energy mix and has set targets for cleaner energy technologies (including of 6000MW solar PV contribution to new power generation capacity) by 2030 (IRP, 2019). Renewable energy plays a key role in mitigating global greenhouse gas emissions by radically lowering the emissions profile of the global energy system (International Renewable Energy Agency (IRENA), 2015). The proposed PV facility will assist in reducing the country's CO₂ emissions associated with energy supply relative to fossil fuels (e.g. coal). Development of numerous such facilities will have a cumulative positive impact on CO₂ emissions as this will reduce reliance on power generation from fossil fuels. This will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government is a signatory.

This is considered to be a significant positive impact for the environment and society at an international level.

¹³ Greenhouse Gas Inventory for South Africa: 2000-2010

¹⁴ Greenhouse Gas Inventory for South Africa: 2010-2017

¹⁵ <http://ecowatch.com/2015/03/23/renewables-mitigate-climate-change/>

8.11 Conclusion regarding 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. The most significant of these will be the contribution towards a reduction in greenhouse gas emissions and consequent assistance with climate change mitigation.

The alignment of renewable energy developments with the IRP 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 social and economic benefits of renewable energy developments at a local, regional, and national level have the potential to be significant. However, there is a lack of understanding of the cumulative impacts on other environmental and social receptors such as birds, visual amenity, and landscape character of the affected areas largely due to limited information of impacts from existing facilities within the country. This assessment is therefore qualitative.

The assessment of the cumulative impacts was undertaken through the consideration of the Brakpan 1 Solar Energy Facility impacts in isolation and compared its (Brakpan 1 Solar Energy facility) to the cumulative impacts of other solar facilities, including the associated projects within the Poortjie Wes Cluster, and within a 30km radius from the development area. Cumulative impacts are expected to occur with the development of Brakpan 1 Solar Energy Facility throughout all phases of the project life cycle and within all areas of study considered as part of this Basic Assessment ("BA") Report. The main aim for the assessment of cumulative impacts considering Brakpan 1 Solar Energy Facility 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 Brakpan 1 Solar Energy Facility are predominately low to medium. A summary of the cumulative impacts is included in **Table 8.3**.

Table 8.3: Summary of the cumulative impact significance for Brakpan 1 Solar Energy facility 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	Medium	Medium
Avifauna	Medium	Medium
Heritage (archaeology and palaeontology)	Low	Low
Visual	Medium	Medium
Positive Social Impacts (Impacts on the local economy)	Low	High
Negative Social Impacts (Impacts on sense of place and local services)	Low	Medium
Traffic	Low	Medium

Considering the findings of the cumulative specialist assessments undertaken for the project the following can be concluded considering the Brakpan 1 Solar Energy facility:

- » There will be no unacceptable loss of biodiversity (vegetation, species types, and ecological processes) due to the degree of avoidance of the development area in relation to remaining high and very high areas of ecological importance within the broader project site and the region.
- » It is unlikely that the proposed development will result in a significant negative effect on the long-term viability or persistence of avifaunal populations in the area given the availability of suitable habitat for SCCs in the area.
- » The construction of the project will not result in the complete or whole-scale change in sense of place and character of the area nor will the project result in unacceptable visual intrusion.
- » The construction of the project will not result in unacceptable loss of or impact to heritage resources. Impacts on cultural landscape have been minimised through the appropriate placement of the facility on the site outside of sensitive landscape features.
- » The project will not significantly increase the negative impact on the social environment. However, an increase in positive impacts, specifically as a result of job creation and socio-economic benefits, can be expected.
- » The project will contribute towards a reduction in greenhouse gas emissions from energy generation and will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government has committed to become a signatory.

Based on a detailed evaluation, the cumulative impacts associated with the construction and operation of the proposed Brakpan 1 Solar Energy Facility and other proposed renewable energy facilities in the region are considered to be acceptable. The location of this project within the Beaufort West REDZ is considered a desirable location for further consideration provided that environmental impacts are mitigated to suitable standards as recommended within this BA Report.

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

Brakpan 1 Solar Energy Facility (Pty) Ltd. the ("Independent Power Producer") proposes to develop the Brakpan 1 Solar Energy Facility and its associated infrastructure (the "Project/Facility") on a site approximately 15km north-west of Nelspoort and 60km south-west of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The Project site is located within a Renewable Energy Development Zone ("REDZ"), the Beaufort West ("REDZ 11"), and the Central Transmission Corridor. The Facility is to be developed with a maximum installed capacity of 220 MW and will have a contracted capacity of 190MW.

The Project is earmarked for submission into the South African Government's Renewable Independent Power Producer ("REIPP") Procurement Programme or for a Private Off-take.

The Project (Brakpan 1 Solar Energy Facility) is part of a cluster known as the Poortjie Wes Cluster (the "Cluster"). The Cluster entails the development of six (6) solar energy facilities. All six (6) renewable energy ("RE") facilities will connect to the proposed 132kV Belvedere Collector Switching Station (the "Collector Switching Station") via 132kV Overhead Lines ("OHLs") or directly to the new Poortjie Wes LILLO MTS. The proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILLO MTS ("Poortjie Wes LILLO MTS") via a 132kV OHL.

A technically suitable project site of ~450ha has been identified by Brakpan 1 Solar Energy Facility (Pty) Ltd for the establishment of the PV Facility. The project site is located on the Farm Poortjie No. 76, in the Kamdeboo Municipality, division of Murraysburg, Western Cape Province.

The development footprint for the Facility allowing the Facility to generate 220MWp will be approximately 395ha and will contain the following infrastructure:

(1) Solar Facility

- » PV modules (mono or bifacial);
- » Single or dual axis tracking structures, Fixed Axis Tracking, or Fixed Panels;
- » Fixed tilt mounting structure (to be considered during the design phase of the Facility);
- » Galvanised steel and/or aluminium solar module mounting structures;
- » Solar module substructure foundations. These will likely be drilled into the ground, filled with concrete, and then have posts fixed inside them. Alternately, ramming may be used; and
- » 60 to 65 Central Inverter stations.

(2) Building Infrastructure

- » Offices;
- » Operational and maintenance control centre;
- » Warehouse/workshop;
- » Panel maintenance and cleaning area;
- » Ablution facilities;
- » A conservancy tank for storage of sewage underground with a capacity of up to 35m³; and
- » Guard Houses.

(3) Associated Infrastructure

- » On-site substation building - IPP owned (including lightning conductor poles);

- » Eskom switching station and 132kV OHL, to be handed over to Eskom at Commercial Operation Date ("COD") (this forms part of a separate BA);
- » Battery storage (500MW/500MWh);
- » Internal distribution lines of up to 33 kV;
- » Underground low voltage cables or cable trays;
- » Internal gravel roads;
- » Fencing;
- » Stormwater channels;
- » Temporary work area during the construction phase; and an
- » Access road to site from the existing District gravel road between (i.e. DR2396, OP9213 OP9212), which are accessible via District road No. MR 587, between Nelspoort and Murraysburg.

A development area of 450ha has been identified within the project site by the proponent for the development of the Brakpan 1 Solar Energy Facility and associated infrastructure. The identification of this development area considered technical and environmental constraints in the larger property in line with a typical mitigation hierarchy. The development area has been fully considered within this BA process and assessed in terms of its suitability from an environmental and social perspective.

Brakpan 1 Solar Energy Facility (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 Beaufort West REDZ, as well as the proximity of the area to authorised and constructed solar energy facilities (as discussed in Chapter 8). The development area is regarded as being of a sufficient extent to provide an opportunity for the avoidance of major environmental sensitivities.

A summary of the recommendations and conclusions for the proposed development as determined through the BA process is provided in this Chapter.

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

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of 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 Brakpan 1 Solar Energy Facility has been included in section 9.2 .
3(l) an environmental impact statement that contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale that 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 Brakpan 1 Solar Energy Facility has been included in section 9.5 . Sensitive environmental features located within the Brakpan 1 Solar Energy Facility study area and development area, overlain with the proposed development footprint have been identified and are shown in Figure 9.1 . A summary of

Requirement	Relevant Section
	the positive and negative impacts associated with the Brakpan 1 Solar Energy Facility has been included in section 9.4 .
h (xi) a concluding statement indicating the preferred alternatives, including the preferred location of the activity.	A concluding statement indicating the preferred alternatives and the preferred location of the activity is included in section 9.5 .
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of the authorisation.	All conditions required to be included in the Environmental Authorisation of Brakpan 1 Solar Energy Facility have been included in section 9.6 .
3(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether Brakpan 1 Solar Energy Facility should be authorised has been included in section 9.6 .

9.2. Evaluation of Brakpan 1 Solar Energy Facility

The preceding chapters of this BA Report together with the specialist studies contained within **Appendices D-J** provide a detailed assessment of the potential impacts that may result from the development of the Brakpan 1 Solar Energy Facility. 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 Brakpan 1 Solar Energy Facility. 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.

The Ecological Importance of the development area is regarded as Medium, specifically from a fauna biodiversity and habitat perspective. However, the location of the development area has achieved an acceptable extent of avoidance within the project site, which will not result in unacceptable residual impacts. 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.

From the specialist studies undertaken it was determined that soils and agricultural aspects did not require detailed assessment (refer to **Appendix F**). The most sensitive soil forms that can be expected for the area include the Hutton and Oakleaf soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Very Low to Moderate" sensitivities, which correlates with the requirements for a compliance statement only. The available climate can limit crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area. The area is not favourable for most cropping practices. It is worth noting that, additional baseline soil field assessments can provide a better understanding of the soil or land potentials for the project area. It is the specialist's opinion that the proposed solar renewable energy project based on the DAFF (2017) land capability sensitivity of the area will have a limited impact on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed solar renewable energy project development may be favourably considered.

The potential environmental impacts associated with Brakpan 1 Solar Energy Facility identified and assessed through the BA process include:

- » Impacts on ecology, flora, and fauna
- » Impacts on avifauna
- » Impacts on heritage resources, including archaeology, palaeontology, and cultural landscape
- » Visual impacts on the landscape as a result of the project
- » Positive and negative social impacts
- » Impacts on traffic.

9.2.1 Impacts on Ecology

The aim of the Biodiversity Impact Assessment (**Appendix D**) was to provide information to guide the risk of the proposed Brakpan 1 Solar Energy Facility to the ecosystems affected by its development and their inherent fauna and flora. Based on the latest available ecologically relevant spatial data the following information is pertinent to the project area:

- » It is recognised as an Other Natural Area and Ecological Support Area as per the Western Cape Biodiversity Spatial Plan;
- » The Combined Animal Species Theme Sensitivity was rated as 'Moderate' according to the Environmental Screening Tool;
- » The Ecosystem Protection Level for the vegetation type associated with the development footprint is regarded as Poorly Protected; and
- » It is regarded as an Upstream Management Area according to the NFEPA database.

The habitat physiognomy within the project area is not diverse and is considered to be fairly homogenous. However, based on the fauna components recorded within the project area and proximal landscape, the area provides important ecosystem services, particularly with regard to the maintenance of dynamic soil properties and nutrient cycling. The Site Ecological Importance (SEI) of the study area was determined to be 'High' based on the high likelihood of occurrence for NT species, the extent of the area considered and its connectivity to natural areas within the landscape, and the low resilience of the vegetation type.

The main expected impacts of the proposed Brakpan 1 Solar Facility will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, the project possesses a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted. Moreover, the avoidance and minimisation mitigation measures are the most important with respect to the mitigation hierarchy.

To evaluate the extent of 'avoidance' achieved for the project, the following is noteworthy:

- » The footprint areas for the four proposed solar facilities proposed as part of the Poortjie Wes Cluster amounts to 1 144.645 ha; and
- » The total extent of the entire property area comprises 49 337.900 ha, thus approximately 2% of the property area will be developed.

The project area has been designated as a REDZ (Renewable Energy Development Zone) and taking into consideration the extent of 'avoidance' achieved for the project, it is the opinion of the specialist that the

authorisation of the proposed project may be favourably considered. It is recommended that should any other future developments be proposed for the remaining extent of any 'Very High' or 'High' SEI areas within the associated properties, offset strategies be required for these authorisations.

The PAOI is located within an Upstream Management Area according to the NFEPA database. There are two minor ephemeral drainage lines that traverse the PAOI. However, the channel physiognomy of these drainage systems was not considerably distinct from the terrestrial component and could be regarded as an arid dendritic network. These systems were identified by the distinct soil of the preferential flow paths and the presence of *Vachellia karoo*.

A 50 m buffer was applied to these drainage systems (Macfarlane et al, 2009) as they are regarded as Ecological Support Areas and during surface flow would be important in the distribution of propagules.

The following Zones of Regulation ("ZoR") apply to the drainage lines identified within the PAOI:

- » A 32 m Zone of Regulation in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) should be assigned to the drainage lines; and
- » A 100 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) should be assigned to the drainage lines.

The proposed solar facility is expected to pose a low residual risk to the delineated drainage lines, with key mitigation being the avoidance and adherence to the recommended buffer widths. Due to the low residual risk, a General Authorisation is required for the required water use authorisation.

9.2.2 Impacts on Avifauna

In terms of the findings of the Avifauna Assessment (refer to **Appendix E**) the proposed development site appears to be well suited for the development of renewable energy facilities as proposed. The proposed development site is located outside of major avifaunal sensitivities and does not represent unique avifaunal habitat in the context of the broader area. The available habitat across the site is already modified through grazing pressure and is located relatively close to existing overhead transmission lines, which translates into a reduced length of novel overhead power line required for the grid connection, reducing the potential impact on species susceptible to collisions with transmission lines such as bustards, cranes, and storks in the area.

The proposed development is unlikely to have a significant negative impact on the long-term viability or persistence of avifaunal species in the area and therefore can be approved from an avifaunal perspective.

9.2.5 Impacts on Heritage (including archaeology and palaeontology)

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social, and scientific reasons. The site possesses several landscape elements contributing to a composite cultural landscape. Significant from a landscape perspective is the distinctive poort and its associated dam, linkage route, and topographical condition. The area is of medium to high sensitivity in terms of the placement of renewable energy infrastructure. The principle of locating PV infrastructure in this environment is acceptable especially if occurring on the flatlands and lower slopes and avoiding the immediate landscape setting of the poort.

No archaeological resources of significance were identified within the area proposed for development although the broader area has archaeological significance in terms of the sensitive dolerite outcrops in the area (**Appendix G**). No impacts on significant archaeological heritage are anticipated.

Five observations of palaeontological significance were noted within the area proposed for development. Three of these have higher levels of significance and are graded III B. These paleontological resources must be collected by a palaeontologist under an approved work plan before construction.

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of a renewable energy Facility in this location is supported from a heritage perspective provided that the infrastructure is located in areas able to tolerate the impact of the high degree of change from a cultural landscape perspective.

As such, the development of Brakpan 1 Solar Energy Facility is not associated with any fatal flaws from a heritage, archaeological and palaeontological perspective, and it is for this reason that the project is considered to be acceptable on the condition that the following recommendations are adhered to:

- » The recommendations of the VIA must be implemented.
- » Palaeontological observations 380, 381 and 385 must be collected by a palaeontologist before construction. This must be done under a workplan application in terms of section 38(8) to be submitted by a palaeontologist and approved by HWC
- » The HWC Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- » Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artifacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials, or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and HWC must be alerted immediately to determine an appropriate way forward.

9.2.6 Visual Impacts

The visual assessment (refer to **Appendix H**) of the proposed Brakpan 1 Solar Energy Facility indicates that the construction and operation of the proposed Facility will have a visual effect on both the rural landscape and on sensitive receptors in the study area. The proposed infrastructure will be visible within an area that is generally characterised by low-growing shrubland and wide-open undeveloped spaces. The infrastructure would thus be highly visible and impossible to hide within an area that incorporates potentially various sensitive visual receptors that may consider visual exposure to this type of infrastructure to be intrusive. The low occurrence of such sensitive visual receptors within this environment, specifically close to the proposed Facility, is of relevance, however, and has affected the significance rating of the anticipated visual impacts.

Overall, the post-mitigation significance of the visual impacts is predominately **low to negligible**. No visual impacts with a high residual significance are anticipated.

Notwithstanding the above, there are not many options as to the mitigation of the visual impact of the proposed infrastructure. No amount of vegetation screening or landscaping would be able to hide structures of these dimensions, especially within this receiving environment.

This assessment has adopted a risk-averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors (bar the landowners of the properties earmarked for the development), would be predominantly negative towards the Brakpan 1 Solar Energy Facility in the region. While still keeping in mind that there are also likely to be supporters of the Facility (as a possible employer and income generator in the region) amongst the population of the larger region, they are largely expected to be indifferent to the construction of the Facility and not as vocal in their support for the Facility as the detractors thereof.

Therefore, with the information available to the specialist at the time of writing this report, it cannot be empirically determined that the statistical majority of objecting stakeholders were exceeded. If evidence to the contrary surfaces during the progression of the development application, the specialist reserves the right to revise the statement below.

Therefore, the likelihood that the proposed development will be met with concern and objections from some of the affected sensitive receptors in the region, this report cannot categorically state that any of the above conditions were transgressed. As such these visual impacts are not considered to be fatal flaws for a development of this nature particularly due to the remote location of the study area and very low density of visual receptors. It is, therefore, suggested that the proposed Brakpan 1 Solar Energy Facility, as per the assessed layout be supported from a visual perspective, subject to the implementation of the suggested best practice mitigation measures provided in the specialist report.

9.2.7 Social Impacts

The findings of the SIA (**Appendix I**) indicate that the development of the proposed 220 MW Brakpan 1 PV SEF and associated infrastructure will create employment and business opportunities for locals in the BWM during both the construction and operational phase of the project.

The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented to maximise the potential benefits. The significance of this impact is rated as **High Positive**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the REIPP Procurement Programme has resulted in significant socio-economic benefits, both at a national level and local community level. These benefits are linked to foreign Direct Investment, local employment and procurement, and investment in local community initiatives. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure. The establishment of the proposed 220 MW Brakpan 1 PV SEF and associated infrastructure including a BESS is therefore supported by the findings of the SIA.

The enhancement and mitigation measures outlined in the SIA and other key specialist reports should be implemented.

9.2.8. Impacts on Traffic

The potential traffic and transport-related impacts for the construction and operation phases of the proposed Brakpan 1 Solar Energy Facility were assessed (refer to **Appendix J**). The following was concluded:

- » The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of **medium significance** before and of **low significance** after mitigation.
- » During operation, it is expected that maintenance and security staff will periodically visit the Facility. It is assumed that approximately 60 full-time employees will be stationed on-site (subject to change). The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- » The traffic generated during the decommissioning phase will be less than the construction phase traffic and the impact on the surrounding road network will also be considered negative and of **medium significance** before and **low significance** after mitigation.

The potential mitigation measures mentioned in the construction phase are:

- » Dust suppression
- » Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- » The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network by reducing the construction trips and the distance travelled to transport the materials to the site.
- » Staff and general trips should occur outside of peak traffic periods.
- » A "dry run" of the preferred route.
- » Design and maintenance of internal roads.
- » If required, any low hanging overhead lines (lower than 5.1 m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.

The construction and decommissioning phases of development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase. The duration of this phase is short term i.e., the impact of the traffic on the surrounding road network is temporary and a solar Facility, when operational, does not add any significant traffic to the road network.

Both the proposed access point and the access road to the Facility are deemed feasible from a traffic engineering perspective.

The development is supported from a transport perspective provided that the recommendations and mitigations contained in the specialist report (**Appendix J**) are adhered to.

The potential impacts associated with the proposed Brakpan 1 Solar Energy Facility and associated infrastructure are acceptable from a transport perspective and it is therefore recommended that the proposed Facility be authorised.

9.2.9 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. The most significant of these will be the contribution towards a reduction in greenhouse gas emissions and consequent assistance with climate change mitigation.

The alignment of renewable energy developments with the IRP 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 social and economic benefits of renewable energy developments at a local, regional, and national level have the potential to be significant. However, there is a lack of understanding of the cumulative impacts on other environmental and social receptors such as birds, visual amenity, and landscape character of the affected areas largely due to limited information on impacts from existing facilities within the country. This assessment is therefore qualitative.

The significance of the cumulative impacts associated with the development of the Brakpan 1 Solar Energy Facility is predominately low to medium, depending on the impacts being considered, although were found to be acceptable due to appropriate placement of infrastructure outside remaining high and very sensitive areas within the project site. A summary of the cumulative impacts is included in **Table 8.3**.

Table 8.3: Summary of the cumulative impact significance for Brakpan 1 Solar Energy Facility within the development area

Specialist assessment	The overall significance of the impact of the proposed project considered in isolation	Cumulative significance of the impact of the project and other projects in the area
Ecology	Medium	Medium
Avifauna	Medium	Medium
Heritage (archaeology and palaeontology)	Low	Low
Visual	Medium	Medium
Positive Social Impacts (Impacts on the local economy)	Low	High
Negative Social Impacts (Impacts on the sense of place and local services)	Low	Medium
Traffic	Low	Medium

Considering the findings of the cumulative specialist assessments undertaken for the project the following can be concluded considering the Brakpan 1 Solar Energy Facility:

- » There will be no unacceptable loss of biodiversity (vegetation, species types, and ecological processes) due to the degree of avoidance of the development area in relation to remaining high and very high areas of ecological importance within the broader project site and the region.
- » It is unlikely that the proposed development will result in a significant negative effect on the long-term viability or persistence of avifaunal populations in the area given the availability of suitable habitats for SCCs in the area.

- » The construction of the project will not result in the complete or whole-scale change in sense of place and character of the area nor will the project result in unacceptable visual intrusion.
- » The construction of the project will not result in an unacceptable loss of or impact on heritage resources. Impacts on the cultural landscape have been minimised through the appropriate placement of the facility on the site outside of sensitive landscape features.
- » The project will not significantly increase the negative impact on the social environment. However, an increase in positive impacts, specifically as a result of job creation and socio-economic benefits, can be expected.
- » The project will contribute towards a reduction in greenhouse gas emissions from energy generation and will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government has committed to becoming a signatory.

Based on a detailed evaluation, the cumulative impacts associated with the construction and operation of the proposed Brakpan 1 Solar Energy Facility and other proposed renewable energy facilities in the region are considered to be acceptable. The location of this project within the Beaufort West REDZ is considered to be a desirable location for further consideration provided that environmental impacts are mitigated to suitable standards as recommended within this BA Report.

9.3. Environmental Sensitivity

As part of the specialist investigations undertaken within the development area of Brakpan 1 Solar Energy Facility, specific environmental features were identified which will be impacted by the placement of the development footprint (i.e. project infrastructure) associated with the Facility. The current condition of the features identified (i.e. intact or disturbed) informed the sensitivity of the environmental features and the 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 9.1**. **Figure 9.2** is the final layout map for Brakpan 1 Solar Energy Facility considering environmental sensitivities. The features identified specifically relate to ecological and avifauna habitats. The following points describe the features present within the development area, as well as the surrounding area:

- » It is recognised as the Other Natural Area and Ecological Support Area as per the Western Cape Biodiversity Spatial Plan.
 - » The Combined Animal Species Theme Sensitivity was rated as 'Moderate' according to the Environmental Screening Tool.
 - » The Ecosystem Protection Level for the vegetation type associated with the development footprint is regarded as Poorly Protected.
 - » Following the field investigations, the site was defined as having a High SEI based on faunal sensitivities.
 - » It is regarded as an Upstream Management Area according to the NFEPA database.
- » Although largely outside of the development area the following avifauna features have been identified:
- * One SCC recorded during either season was Ludwig's Bustard, and while this species was recorded on multiple occasions this may represent the same individual
 - * Avifaunal SCCs observed in the broader area include Martial Eagle, Lanner Falcon, Secretarybird, Blue Crane, Karoo Korhaan, Southern Black Korhaan, and Verreaux's Eagle.

Considering the features identified within the project site and development area, the specialists have indicated the acceptability of the proposed development. Given the degree of avoidance of the development area of High and Very High areas of ecological importance within the project site as well as avoidance of the avifauna, buffers referred to above, the development may be considered acceptable as the residual impacts are expected to be of medium significance.

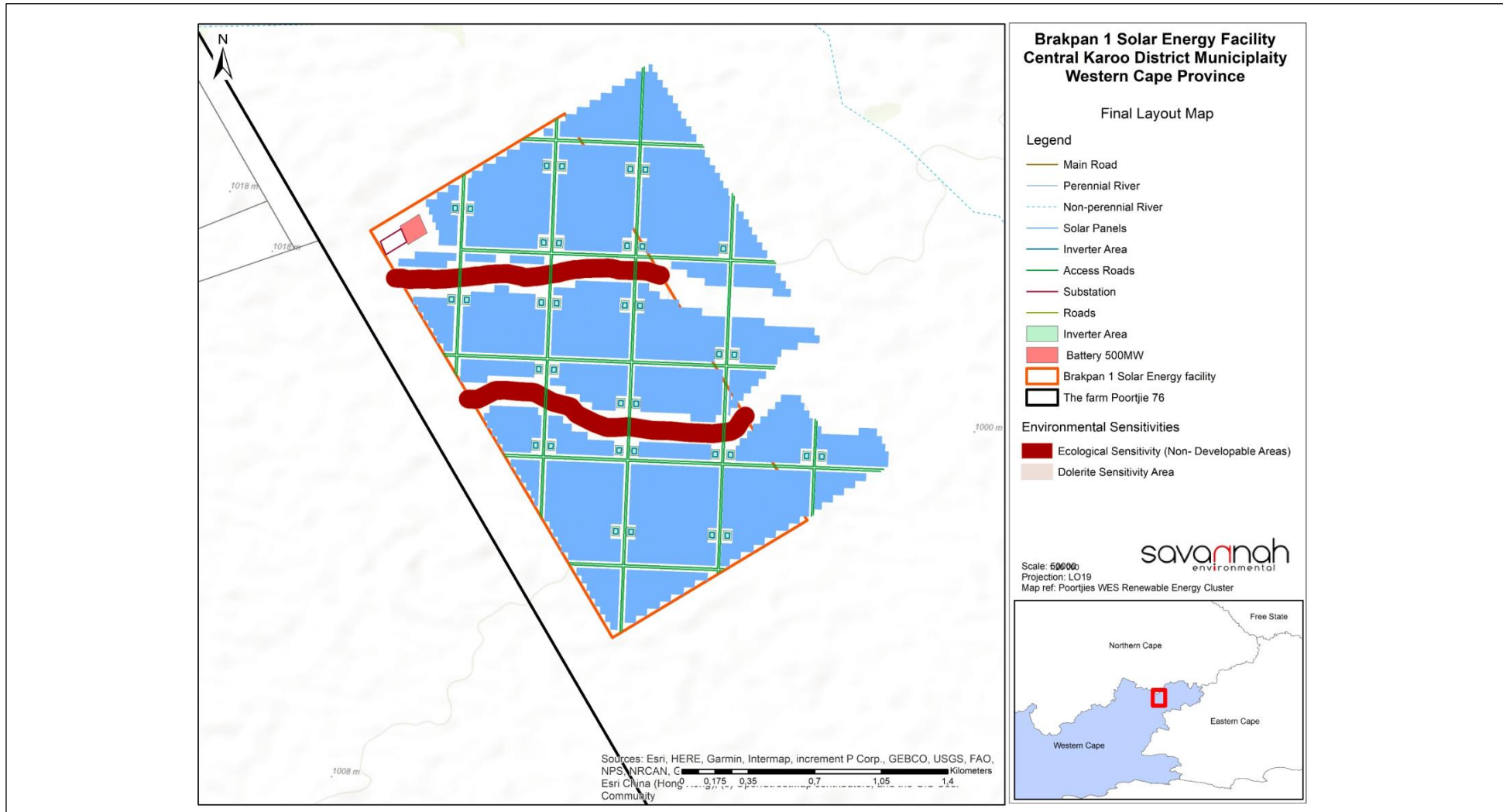


Figure 9.2: Final layout map of Brakpan 1 Solar Energy Facility development footprint (Refer also to Appendix N).

9.4. 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 main expected impacts of the proposed Brakpan Pan 1 SEF will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, it was determined that the project site possesses a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted.
- » *Loss of avifauna habitat* – The proposed development site appears to be well suited for the development of renewable energy facilities as proposed. The proposed development site is outside of major avifaunal sensitivities and does not represent unique avifaunal habitat in the context of the broader area.
- » *Visual impacts associated with the solar PV Facility* - The low occurrence of such sensitive visual receptors within this environment, specifically near the proposed Facility, is of relevance, however, and has affected the significance rating of the anticipated visual impacts. Overall, the post-mitigation significance of the visual impacts is predominately low to negligible. No visual impacts with a high residual significance are anticipated.
- » *Loss of land available for agricultural activities within the development footprint* - The environmental cost is anticipated to be very limited due to the limited agricultural potential of the soils on the site.
- » *The irreplaceable loss of heritage resources*- based on the outcomes of the heritage study, it is not anticipated that the proposed development of the solar PV Facility and its associated grid connection infrastructure will negatively impact significant heritage resources on the condition that the recommendations outlined in the Heritage Impact Assessment (Appendix G) are adhered to.

Benefits of Brakpan 1 Solar Energy Facility and associated infrastructure 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 toward the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- » The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy development.
- » The project contributes 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 of 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. Brakpan 1 Solar Energy Facility will contribute to achieving goals for the implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of the Brakpan 1 Solar Energy Facility are expected to occur at a national, regional, and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure 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.

9.5. Overall Conclusion (Impact Statement)

The applicant has identified the construction and operation of a solar PV facility with an installed capacity of up to 220MW_{AC} on the project site located approximately 15km north-west of Nelspoort and 60km south-west of Beaufort West within the Central Karoo District Municipality in the Western Cape Province as a technically feasible project. A technically viable development area and development footprint was proposed by the proponent following a pre-feasibility analysis which considered both technical and environmental factors and is 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.

From a review of the relevant policy and planning framework, it was concluded that the project is well-aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and national level. The project development area is located outside of any protected area and outside of any Critical Biodiversity Areas (CBAs) as defined in the Provincial Conservation Plan. When considering biodiversity and socio-economic benefits and impacts on the affected and surrounding areas, the specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of the Brakpan 1 Solar Energy Facility and its associated infrastructure within the development area.

From a biodiversity perspective, the site is not located within a protected area. The site is located within an area defined as Other Natural Areas. The habitat present within the development area is not diverse and is considered to be homogenous. The Site Ecological Importance (SEI) of the study area was determined to be 'High' based on the high likelihood of occurrence for NT species, the extent of the area considered and its connectivity to natural areas within the landscape, and the low resilience of the vegetation type.

The main expected impacts of the proposed Brakpan 1 Solar Facility will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, the project possesses a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted. Moreover, the avoidance and minimisation mitigation measures are the most important with respect to the mitigation hierarchy. However, the project development is considered acceptable given the extent of avoidance achieved in relation to the remaining High and Very High areas within the project site as well as the avoidance of recommended avifaunal buffers, and the medium residual impacts remaining after mitigation.

The proposed infrastructure will be visible within an area that is generally characterised by low-growing shrubland and wide-open undeveloped spaces. The infrastructure would thus be highly visible and impossible to hide within an area that incorporates potentially various sensitive visual receptors that may consider visual exposure to this type of infrastructure to be intrusive. The low occurrence of such sensitive visual receptors within this environment, specifically near the proposed Facility, is of relevance, however, and has affected the significance rating of the anticipated visual impacts. Overall, the post-mitigation significance of the visual impacts is predominately low to negligible. No visual impacts with a high residual significance are anticipated.

No impacts on heritage, archaeological or palaeontological resources are expected as a result of the absence of sites of significance within the development area. The area is of medium to high sensitivity in terms of the placement of renewable energy infrastructure. The principle of locating PV infrastructure in this environment is acceptable especially if occurring on the flatlands and lower slopes and avoiding the

immediate landscape setting of the poort. Based on the low visual impact expected the impact on the cultural landscape is expected to be acceptable.

The Socio-economic Impact Assessment has identified positive and negative short-term (construction related) impacts and positive and negative operational related socio-economic impacts. Brakpan 1 Solar Energy Facility is unlikely to result in permanent damaging social impacts and will result in several positive 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.

As detailed in the cost-benefit analysis, the benefits of the Brakpan 1 Solar Energy Facility are expected to occur at a national, regional, and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to outweigh the environmental costs of the solar PV Facility.

The Facility layout assessed through this BA process is considered the most appropriate development footprint for Brakpan 1 Solar Energy Facility and considered to be acceptable within all fields of specialist studies undertaken for the project and no environmental fatal flaws have been identified. The acceptability of the development is based on the avoidance of environmental features considered to be of very high sensitivity and not appropriate for development and disturbance within the project site. All impacts associated with the 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 the Brakpan 1 Solar Energy Facility within the study area and development area, it can be concluded that the development of the solar PV Facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures).

9.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the proponent, the avoidance of the sensitive environmental features within the project site as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the Environmental Assessment Practitioner (EAP) that the development of Brakpan 1 Solar Energy Facility is acceptable within the landscape and can reasonably be authorised (**Figure 9.5**). The development of the Brakpan 1 Solar Energy Facility within the Beaufort West REDZ is also supported by the Strategic Environmental Assessment (SEA) undertaken by the CSIR on behalf of DFFE for the determination of the REDZ focus areas.

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

(1) Solar Facility

- » PV modules (mono or bifacial);
- » Single or dual axis tracking structures, Fixed Axis Tracking, or Fixed Panels;
- » Fixed tilt mounting structure (to be considered during the design phase of the Facility);
- » Galvanised steel and/or aluminium solar module mounting structures;
- » Solar module substructure foundations. These will likely be drilled into the ground, filled with concrete, and then have posts fixed inside them. Alternately, ramming may be used; and
- » 60 to 65 Central Inverter stations.

(2) Building Infrastructure

- » Offices;
- » Operational and maintenance control centre;
- » Warehouse/workshop;
- » Panel maintenance and cleaning area;
- » Ablution facilities;
- » A conservancy tank for storage of sewage underground with a capacity of up to 35m³; and
- » Guard Houses.

(3) Associated Infrastructure

- » On-site substation building - IPP owned (including lightening conductor poles);
- » Eskom switching station, to be handed over to Eskom at Commercial Operation Date ("COD") (this forms part of a separate BA);
- » Battery storage (500MW/500MWh);
- » Internal distribution lines of up to 33 kV;
- » Underground low voltage cables or cable trays;
- » Internal gravel roads;
- » Fencing;
- » Stormwater channels;
- » Temporary work area during the construction phase; and an
- » Access road to the site is from the existing District gravel roads, i.e. MR 587 (between Nelspoort and Murraysburg), DR2396, OP9213 and OP9212.

The following key conditions would be required to be included within the authorisation issued for Brakpan 1 Solar Energy Facility:

- » All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D to J**, are to be implemented.
- » The EMPr as contained within **Appendix K and Appendix L** of this BA Report should form part of the contract with the Contractors appointed to construct and maintain the solar PV Facility to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of Brakpan 1 Solar Energy Facility is considered key in achieving the appropriate environmental management standards as detailed for this project.
- » Following the final design of Brakpan 1 Solar Energy Facility, a final layout must be submitted to DFFE for review and approval prior to commencing with construction.
- » A pre-construction walk-through of the final development footprint for species of conservation concern that would be affected and that can be translocated must be undertaken before the commencement of the construction phase. Permits from the relevant national and provincial authorities, i.e., the Cape Nature must be obtained before the individuals are disturbed.
- » The project footprint must remain within the assessed development area.
- » A follow-up assessment on avian biodiversity and species abundance within the project site and surrounding areas must be conducted within one year after the Facility has been in operation and should be repeated every 3-to 5 years.
- » Chance Fossil Finds Procedure should be implemented for the duration of construction activities.
- » The environmental authorisation required for Brakpan 1 Solar Energy Facility is for 10 years as Facilitythe would need to be selected as Preferred Bidder by the Department of Mineral Resource and Energy ("DMRE") in the REIPP Procurement Programmes or similar procurement programme released in future by government and private off-takers.

