MUTSHO SOLAR PV3

Limpopo Province

EIA Report

January 2023

DFFE Reference No.: 14/12/16/3/3/2/2182

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PROJECT DETAILS

DFFE Ref No.:	:	14/12/16/3/3/2/2182
Title	:	Environmental Impact Assessment Process: EIA Report for Mutsho Solar PV3, Limpopo Province
Authors	:	Savannah Environmental (Pty) Ltd Chantelle Geyer Jo-Anne Thomas
Client	:	Mutsho Power (Pty) Ltd
Report Revision	:	Draft for public review
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When used as a reference this report should be cited as: Savannah Environmental (2022) EIA Report for Mutsho Solar PV, Limpopo Province.

PURPOSE OF THE SCOPING REPORT AND INVITATION TO COMMENT

Mutsho Power (Pty) Ltd is proposing the construction and operation of a commercial Photovoltaic (PV) Solar Energy Facility and associated infrastructure and have appointed Savannah Environmental as the independent environmental consultant to undertake the Scoping and Environmental Impact Assessment (S&EIA) for the proposed project. The S&EIA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations, as amended, promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This EIA Report consists of twelve chapters, as follows:

- **Chapter 1** provides background to Mutsho Solar PV3 and the EIA process.
- **Chapter 2** provides a description of Mutsho Solar PV3 and infrastructure associated with the facility.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** describes solar as a power generation option and provides insight to technologies for solar energy.
- **Chapter 5** outlines the strategic regulatory and legal context for energy planning in South Africa, and specifically for the proposed facility.
- **Chapter 6** describes the need and desirability of Mutsho Solar PV3 within the project site.
- **Chapter 7** outlines the process which was followed during the EIA process.
- **Chapter 8** describes the existing biophysical and socio-economic environment affected by the proposed facility.
- **Chapter 9** provides a description and assessment of the potential impacts associated with the proposed Solar Energy Facility and associated infrastructure.
- **Chapter 10** provides a description and assessment of the potential cumulative impacts associated with the proposed Solar Energy Facility and associated infrastructure.
- **Chapter 11** presents the conclusions and recommendations based on the findings of the EIA for Mutsho Solar PV3.
- **Chapter 12** provides references used in the compilation of the EIA Report.

The EIA Report is available for review from **Friday, 13 January 2023 – Monday, 13 February 2023** on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/). All comments received during the 30-day review and comment period will be included, considered and addressed within the Final EIA report for the consideration of the National Department of Forestry, Fisheries and the Environment (DFFE).

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

EXECUTIVE SUMMARY

Mutsho Power (Pty) Ltd is proposing the construction and operation of a commercial Photovoltaic (PV) Solar Energy Facility and associated infrastructure on the Remaining Extent of Farm Vrienden 589 MS, located approximately 8km south-west of Mopane and 39km south-west of Musina, within the Musina Local Municipality and the Vhembe District Municipality in the Limpopo Province (refer to **Figure 1**). The facility will have a contracted capacity of up to 100MW and will be known as Mutsho Solar PV3. The project is planned as part of a cluster of renewable energy projects, which include three (3) additional 100MW Solar PV Energy Facilities and grid connection infrastructure connecting the facilities to the national grid, with the point of connection being the existing Nzhelele Substation. It is the developer's intention to develop the projects in a phased approach (i.e., 100MW at a time). The projects are proposed by separate Specialist Purpose Vehicles (SPVs)[1], and are assessed through separate Environmental Impact Assessment (EIA) processes. Similarly, the grid connection solution will be subjected to a separate Basic Assessment (BA) process in order to facilitate handover of this infrastructure to Eskom once constructed.

Mutsho Solar PV3 is proposed in response to the identified objectives of national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid the proposed project under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or a similar private programme, with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP), with the Mutsho Solar PV3 set to inject up to 100MW of electricity into the national grid.

From a regional perspective, the identified area within the Limpopo Province is considered favourable for the development of a commercial solar energy facility by virtue of prevailing climatic conditions, relief, the extent of the affected properties, the availability of a direct grid connection (i.e., a point of connection of the national grid) and the availability of land on which the development can take place. A technically feasible project site[2], with an extent of ~1 237ha has been identified by Mutsho Power (Pty) Ltd as a technically suitable area for the development of Mutsho Solar PV3. The project site is described in **Table 1** below.

Table 1: Detailed description of the Mutsho Solar PV3 project site

Province	**Mpumalanga Province**
District Municipality	Vhembe District Municipality
Local Municipality	Musina Local Municipality
Ward Number (s)	Ward 02
Nearest town(s)	Mopane (~8km south-west) and Musina (~39km south-west)
Affected Properties:	Remaining Extent of Farm Vrienden 589 MS (T0MS000000000058900000)

The full extent of the project site has been considered within the EIA process with the aim of determining the suitability from an environmental and social perspective and identifying areas that should be avoided in development planning. Within this identified project site, a development area and a development footprint

[1] The development of the various projects under separate SPVs is in accordance with the DMRE's requirements under the REIPPPP.
[2] The project site is the area with an extent of 1 237ha, within which the Mutsho Solar PV3 development footprint will be located.

have been defined for assessment. The project site is larger than the area required for the development footprint of a 100MW Solar Energy Facility and therefore provides the opportunity for the optimal placement of infrastructure, ensuring avoidance of major identified environmental sensitivities or constraints identified through this EIA process.

Mutsho Solar PV3 is proposed in response to the identified objectives of national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid Mutsho Solar PV3 under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or possibly a similar private programme, with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP) published by the Department of Minerals Resources and Energy, with Mutsho Solar PV3 set to inject up to 100MW of electricity into the national grid. Similarly, the location of the new generation in the Limpopo Province is important in the context of the Just Energy Transition (JET). The Mutsho Solar PV3 will provide valuable jobs and socio-economic benefits that are required in an area where coal fired generation will be phased out over the next 10 years (see graph below). This will be vitally important if the JET is to be successfully implemented and is a transition for everyone.

Infrastructure associated with the Solar PV Energy Facility, which will enable the facility to supply a contracted capacity of up to 100MW, will include

- Solar PV array comprising PV panels and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- 33/132kV onsite substation (IPP Portion), including associated equipment and infrastructure – the onsite substation will be completely constructed as part of phase 1 (i.e., as part of Mutsho Solar PV3) but only equipped for the first 100MW. When such a time comes that the next 100 MW is constructed, the existing substation will be equipped for the additional 100MW generation capacity (i.e., additional transformers, extending the busbars, etc.). This approach will be followed as each 100MW facility is added to the cluster.
- Site offices, warehouses, and guardhouses.
- Water storage tanks at admin block for human consumption.
- Laydown areas.
- Internal gravel distribution roads

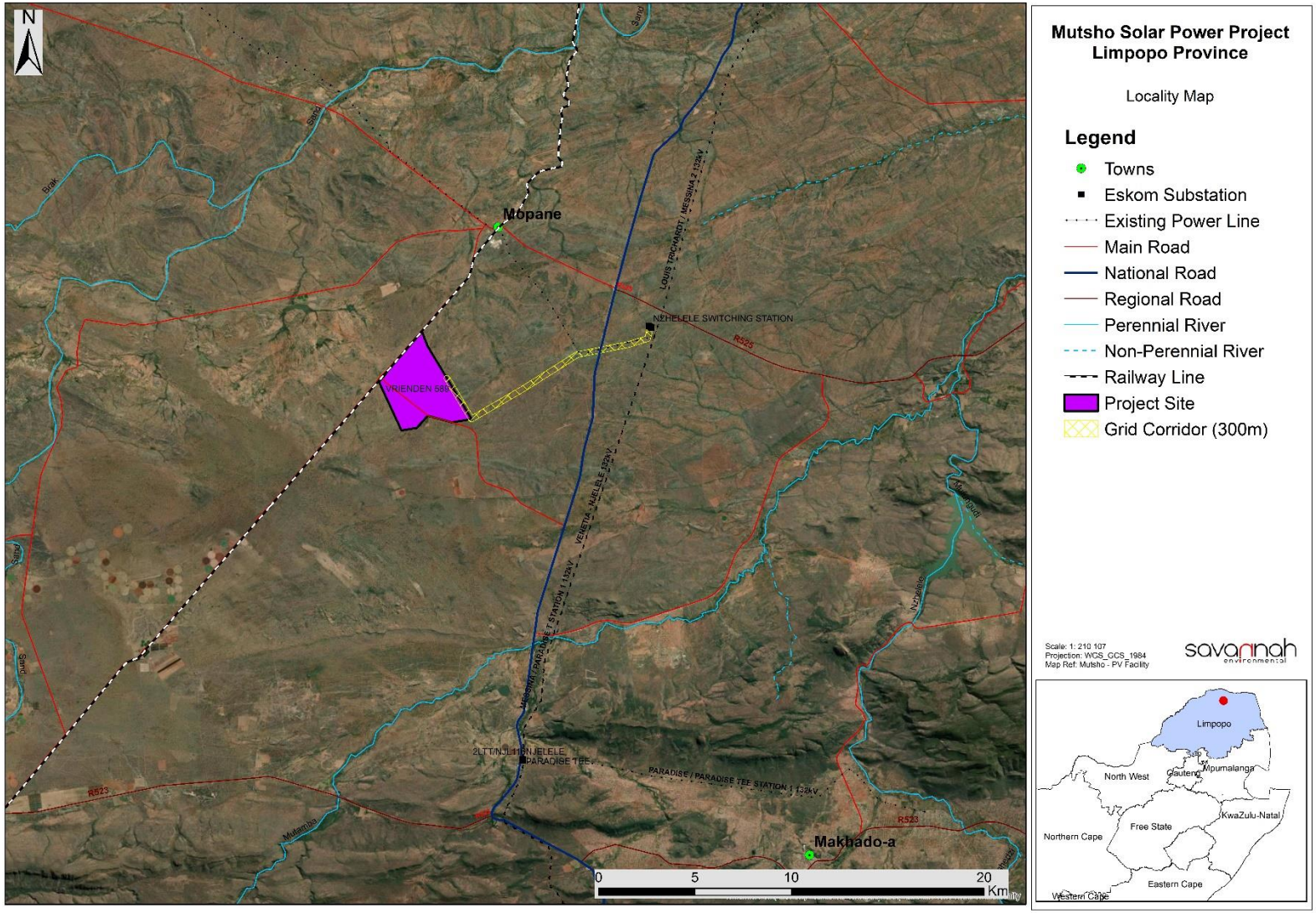

Figure 1: Locality map of the project site within which Mutsho Solar PV3 is proposed to be developed

1. Environmental Permitting Requirements

Mutsho Solar PV3 and its associated infrastructure trigger the need for the following environmental permit:

» **An Environmental Authorisation (EA)** from the National Department of Forestry, Fisheries, and the Environment (DFFE), in consultation with the Provincial Limpopo Department of Agriculture and Rural Development (DARD)), in accordance with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations (GNR 326), 2014, as amended.

Savannah Environmental has been appointed as the Independent Environmental Assessment Practitioner (EAP) in accordance with NEMA and Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326) to undertake the required S&EIA in support of the application for Environmental Authorisation (EA) and the public participation process for the project, in order to identify and assess all potential environmental impacts associated with the proposed Solar Energy Facility and recommend appropriate mitigation measures in an Environmental Management Programme (EMPr).

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be fore warned of potential environmental issues and allows for the resolution of issues reported on in the Scoping and EIA Reports as well as a dialogue with Interested and Affected Parties (I&APs). Comprehensive, independent environmental specialist studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision. The EIA process being undertaken for the proposed general waste disposal site comprises two phases – i.e., Scoping and Impact Assessment - and involves the identification and assessment of environmental impacts through specialist studies, as well as public participation. The process followed in these two phases is as follows:

» The **Scoping Phase** includes the identification and description of potential impacts associated with the proposed project through a desktop study and consultation with interested and affected parties and key stakeholders. This phase considers the broader project area in order to identify and delineate any environmental fatal flaws, no-go or sensitive areas, as well as project alternatives in order to determine which should be assessed in more detail in the EIA Phase. Following the public review period of the Scoping Report, this phase culminates in the submission of a final Scoping Report (this report) and Plan of Study for the EIA Phase to the competent authority for acceptance and approval to continue with the EIA Phase of the process.

» The **EIA Phase** involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint and includes detailed specialist investigations (including field surveys), consideration of feasible alternatives and public consultation. Recommendations of practical and achievable mitigation and management measures are included in an Environmental Management Programme (EMPr) considering all phases of the project. Following the public review period of the EIA Report and EMPr, this phase culminates in the submission of a Final EIA Report and EMPr to the competent authority for review and decision-making.

2. Evaluation of Mutsho Solar PV3

The EIA Report, together with the specialist studies contained within **Appendices D-I** provide a detailed assessment of the potential impacts that may result from the development of Mutsho Solar PV3. No environmental fatal flaws or unacceptable impacts were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the development footprint and the undertaking of the construction and operational bird and bat monitoring, as specified by the specialists.

The potential environmental impacts associated with Mutsho Solar PV3 assessed through the EIA process include:

- Impacts on terrestrial ecology (flora and fauna).
- Impacts on freshwater ecology.
- Impacts on avifauna.
- Impacts on soils and agricultural potential.
- Impacts on heritage resources, including archaeology, palaeontology and the cultural landscape.
- Visual impacts on the area imposed by the components of the facility.
- Positive and negative social impacts.

The development footprint, as assessed in the EIA Report is presented in **Figure 2**.

1.1. Impacts on Terrestrial Ecology (including flora and fauna)

Terrestrial Ecology

Four habitat units were identified during the assessment and included closed woodland, a rocky area, watercourses, and mopane bushveld. The sensitivity of these habitats ranged from high to medium with the closed woodland, rocky area and watercourses regarded as high sensitivity due to the species recorded and the role of this intact unique habitat to biodiversity, whilst the mopane bushveld is regarded as having a medium sensitivity.

A total of 72 plant species were found within the project/study area, which consisted of 67 native, 0 Red List, 4 protected, 0 SA endemic, 0 alien, and 1 NEM:BA listed invasive species.

A total of 13 mammal, 0 amphibian, and 3 reptile species were recorded within the project/study area. No amphibian or reptile SCC were recorded within the study area; and no mammal SoCC were recorded, namely. It was determined that the development will not detrimentally impact these populations as no faunal SCC were recorder within the project/study area.

During the field assessment 3 species of protected trees were observed: *Boscia albitrunca* (Shepard's tree), *Adansonia digitata* (Baobab), and *Sclerocarya birrea subsp. caffra* (Marula). It is of vital importance that a search a rescue along with permit applications be done prior to the commencement of the development. The density of the trees is regarded a very high especially in the case of *B. albitrunca*.

Biodiversity maintenance is one key ecological service provided by the identified terrestrial biodiversity areas through their ecological integrity, importance and functioning. As such the preservation of these systems is an important aspect to consider for the proposed project.

Any development in high sensitivity areas must be avoided as far as possible, which will occur with the selection of the project area. Development within the high sensitivity areas within the project area will lead the direct destruction and loss of functional habitats; and the faunal species that are expected to utilise this habitat. Thus, if these areas are not maintained in a natural or near natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved. The mitigation measures, management and associated monitoring regarding the expected impacts will be the most important factor of this project and must be considered by the issuing authority.

Freshwater Ecology

One (1) form of a watercourse was identified and delineated within the regulated area applied, namely ephemeral drainage lines/ features. Natural wetlands were absent from the project area. The nearest known 'pan' system is more than 3 km north-west of the project area. No functional assessment was completed for the delineated watercourses. A buffer width of 15 m is recommended for each of the drainage features. Regulated areas delineated with a 32m and 100m buffer were also identified and recommended for each drainage feature.

Considering the findings of the assessment, no fatal flaws were identified from a freshwater ecology perspective. Provided that the mitigation is successfully implemented, the specialist is of the opinion that the establishment of the proposed solar facility is unlikely to pose a significant threat to local watercourses with all anticipated impacts having a Low residual risk rating. Supporting remediation measures prescribed herein should also be considered for a project specific stormwater management

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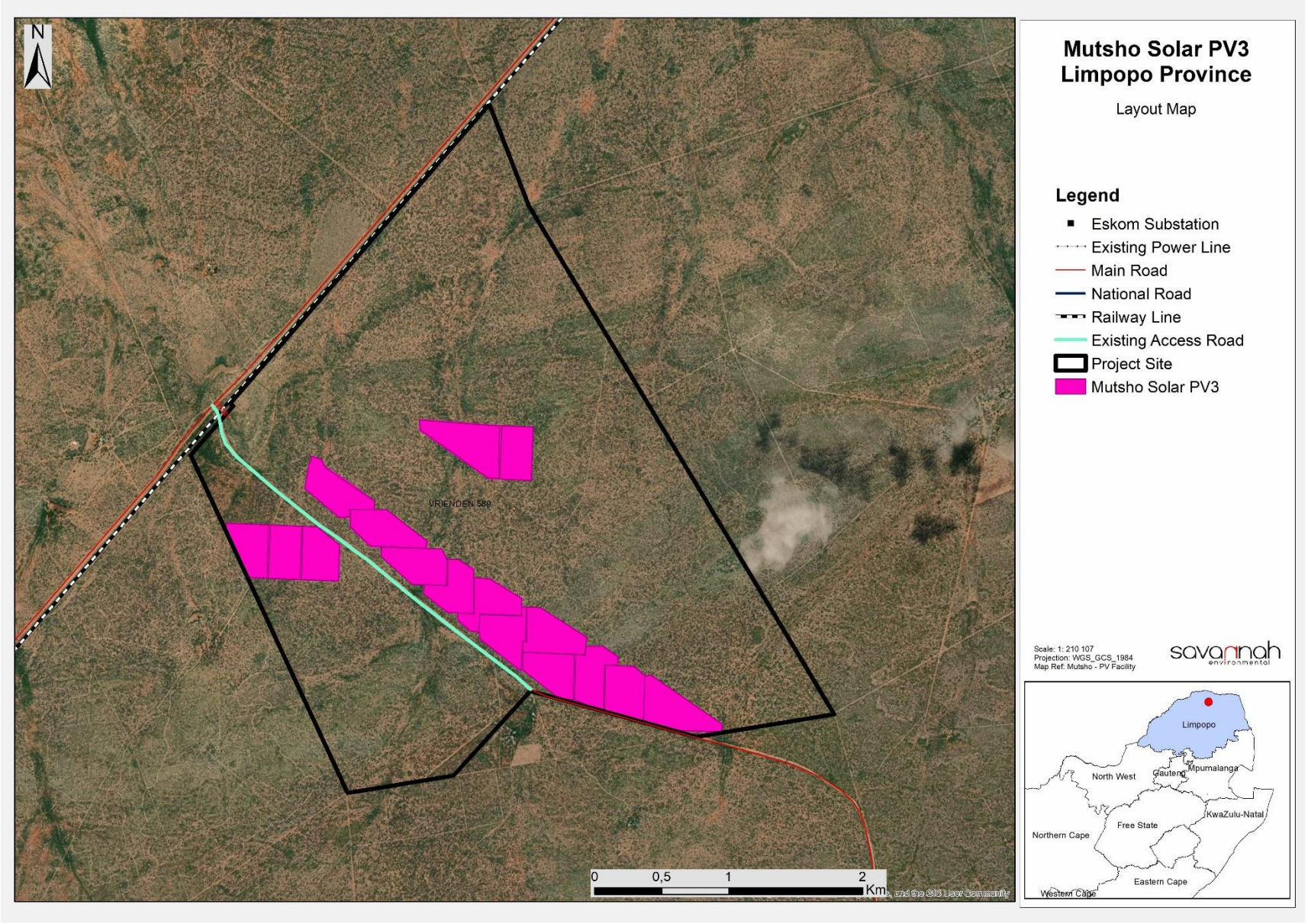

Figure 2: The development footprint of Mutsho PV3, as assessed within the EIA Report

1.2. Impacts on Avifauna

Based on the desktop assessment the project area falls within an ESA1, Vhembe Biosphere Reserve, the Musina Mopane Bushveld vegetation type and have a known occurrence of avifauna SCCs found in and around the project area.

The field assessment was conducted in the winter season and is regarded as a follow up survey that was performed by Pachnoda (2018) in the summer. During this survey fifty-seven (57) bird species were recorded, none of which were an SCC, four species were however identified that is regarded as risk species due to collisions and electrocutions by PV plants and associated infrastructure. They are Southern Pale Chanting Goshawk (*Melierax canorus*), Helmeted Guineafowl (*Numida meleagris*), African Harrier-Hawk (*Polyboroides typus*) and Pied Crow (Corvus albus). Four SCCs, Kori Bustard (*Ardeotis kori*); Black Stork (*Ciconia nigra*); Saddle-billed Stork (*Ephippiorhynchus senegalensis*), and White-backed Vulture (Gyps africanus) were recorded by Pachnoda (2018) which does increase the overall sensitivity of the area.

The main impacts identified to be associated with the proposed project are the loss of habitat, including the loss of nest sites in larger trees such as the Baobabs that will be lost in the area, disturbance, collision and electrocution risk. These impacts are expected to have a large impact on the avifauna community and more specifically the SCCs that has been found and could likely occur in the area.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts. Considering that this area has been identified as being of significance for biodiversity maintenance and ecological processes (Moderate and High sensitivity), development may proceed but with caution and only with the implementation of mitigation measures.

Considering the above-mentioned information, it is the opinions of the specialists that the project, may be favourably considered, on condition all prescribed mitigation measures and supporting recommendations are implemented.

1.3. Impacts on Soils and Agricultural Potential

The most sensitive soil forms identified within the assessment corridor is the Hutton and Nkonkoni soil forms.

The assessment area is associated with arable soils, due to some of the type of soils available. However, the climate limits 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.

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which predominantly covers "Low" to "Moderate" sensitivities. Small patches are characterised by "Very Low" sensitivities. In the assessment area there is no segregation of agricultural lands or crop fields with high potentials. The land capability and land potential in the assessed area concur. The "Very Low to Moderate" sensitivities also falls within the DAFF, (2017) requirements for a compliance statement report only (refer to **Appendix F**).

It is the specialist's opinion that the proposed solar power project 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 power project may be favourably considered.

1.4. Impacts on Heritage Resources (archaeology, palaeontology and cultural landscape)

The current and past heritage assessments of this property have identified limited heritage resources of cultural value. A previous assessment identified Farm Vrienden 589 as preferred for development with limited impacts to heritage resources anticipated as its overall heritage sensitivity is regarded as LOW overall. The most significant site identified in the vicinity of the development is Site V04. It is recommended that Site V04, the Baobab Room, must not be impacted by any activity and any proposed activity on this farm must adhere to a buffer area of 100m around this site. This site is located a significant distance from the area proposed for development.

The PIA notes that "The scarcity of fossil heritage at the proposed development footprint indicate that the impact of the (of the development) will be of a low significance in palaeontological terms… Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources."

In light of these findings, there is no objection to the proposed development on heritage grounds on condition that the recommendations outlined below are adhered to.

Based on the outcomes of the Heritage Impact Assessment, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that:

- The recommendations in the VIA are implemented.
- A 200m no-go buffer must be implemented around site V04.
- A 100m no-go buffer must be implemented around sites MOP112 and MOP115
- The Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- Should any buried archaeological resources or human remain or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

1.5. Visual Impacts

The following sensitivities have been identified from a visual perspective:

- Highly sensitive areas include:
  - Areas immediately surrounding homesteads development of which is likely to significantly change the character of views for residents and guests. A 500m buffer is proposed which should be sufficient to ensure that development does not totally dominate views. It is possible that receptors (owners /residents / guests) have no concern regarding the development of these areas, in which case the sensitivity rating will reduce.

- Medium sensitivity areas include:

- Corridors beside the roads that could be affected. Due to distance, the main roads that run through the area are unlikely to be significantly impacted. As indicated in previously, given that local unsurfaced roads are likely to provide access to local lodges, these also have tourism importance.

» Low sensitivity areas include:
- All other areas of the proposed site.

It was determined that the potential visual impacts would be:
» The impact on the landscape in the area was assessed as having an impact of low significance with mitigation.
» The impact relating to views from local main roads was assessed as having a low significance after mitigation.
» The impact relating to tourist views from trains was assessed as having a low significance after mitigation.
» The impact relating to views from settlements was assessed as having a low significance after mitigation.
» The impact relating to views from homesteads and recreational/local tourism facilities was assessed as having a medium negative significance without mitigation and a low significance after mitigation.
» The impact relating to lighting (security and operational lighting) was assessed as likely to have low significance with mitigation.
» The impact relating to glare will be of low significance with appropriate mitigation.

The proposed project will generally result in landscape and visual impacts of low to high significance. Subject to mitigation measures being undertaken, mitigation measures arising and the recommended mitigation measures, from a Landscape and Visual Impact perspective, it is the specialist's opinion that there is no reason why the proposed layout should not be authorised.

1.6. Socio-Economic Impacts

Impacts are expected to occur with the development of Mutsho Solar PV3 during the construction, operation and decommissioning phases. Both positive and negative impacts are identified and assessed.

Impacts during construction include:
» Impact on production.
» Impact on the Gross Domestic Product (GDP).
» Impact on employment creation.
» Skills development.
» Household income and standard living.
» Temporary increase in government revenue.
» Change in sense of place.
» Impact on agricultural operations
» Influx of people.
» Impact on economic and social infrastructure

Impacts during the operation phase include:
» Impact on production.
» Impact on the GDP.
» Employment creation.

- Household income and standard of living.
- Increase in government revenue.
- Rental revenue for landowners.
- Improvement in energy sector generation.
- Visual and sense of place impacts.
- Impacts on agricultural operations.

Both positive and negative impacts are expected throughout the construction and operation of the proposed solar energy facility. Positive impacts during both construction and operation are expected to be of medium and high significance pre-enhancement and can be increase to medium and high post-enhancement. Negative impacts during both construction and operation are expected to be of medium and low significance pre-mitigation and can be reduced to medium (different score) and low significance post-mitigation, depending on the type of impact.

The net positive impacts associated with the development and operation of the proposed Project are expected to outweigh the net negative effects. The Project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. The Project should therefore be considered for development. It should, however, be acknowledged that the negative impacts would be largely borne by the nearby farms and households residing on them, whilst the positive impacts will be distributed throughout both the local and national economies.

Due to this imbalance, it is recommended that the mitigation measures suggested, be strictly adhered to. Application of these mitigation measures will ensure that the negative impacts on the nearby farms and businesses are minimised and that the distribution of the potential benefits of the project are more balanced. It is important to value to commercial tourism farmer as he believes that he will not be able to continue with is operations due to the projects. It is thus advised that further communication towards the landowners will be vital for the project.

1.7. Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of Mutsho Solar PV3 throughout all phases of the project life cycle and within all areas of study considered as part of this EIA report. The main aim for the assessment of cumulative impacts considering Mutsho Solar PV3 is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The following conclusions can be drawn regarding the cumulative impacts associated with the project:

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes) due to the development of Mutsho Solar PV3 and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no significant loss of sensitive and significant aquatic features. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of Mutsho Solar PV3 and other renewable energy projects within the surrounding area, provided the recommended mitigation

measures are implemented. This is due to the limited footprint expected to be associated with the renewable energy facilities proposed in authorised in the area. The cumulative impact is therefore acceptable.

- The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.
- Change to the sense of place and character of the area is expected with the development of the proposed Mutsho Solar PV3 and other renewable energy facilities within a 30km radius of the site. Other large scale industrial operations including mining operations and power stations are relatively obvious in the region. Whilst the proposed project will create a new industrial operation and change the character of an area of rural landscape, this is not entirely out of character with the region. The cumulative impact is therefore considered to be acceptable.
- There will be no unacceptable loss of heritage resources associated with the development of Mutsho Solar PV3. There will also be no unacceptable impacts to the cultural landscape as a result of the development of the facility provided that the recommended development buffers along major routes are adhered to. The cumulative impact is therefore acceptable.
- No unacceptable social impacts are expected to occur. Two positive cumulative impacts are expected to occur from a social perspective (i.e., increase in production and employment opportunities). These impacts will be of medium significance. Positive cumulative impacts are expected to be beneficial at a regional level. The cumulative impact is therefore acceptable.

The cumulative impacts associated with Mutsho Solar PV3 will be of a low and medium significance. A summary of the cumulative impacts is included in **Table 3** below.

Table 3: Summary of the cumulative impact significance for Mutsho Solar PV3.

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Terrestrial and Freshwater Ecology	Low	Low
Avifauna	Low	Low
Soils and Agricultural Potential	Low	Low
Heritage (including archaeology, palaeontology and sense of place)	Low	Low
Visual	Low	Low
Socio-Economic	*Positive impacts:* Medium *Negative impacts:* Medium	*Positive impacts:* Medium *Negative impacts:* Medium

Based on the specialist cumulative assessment and findings, the development of Mutsho Solar PV3. and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that Mutsho Solar PV3 cumulative impacts will be of low and medium significance. Based on all other areas of study considered as part of this EIA report, the development of Mutsho Solar PV3 will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

2. Environmental Costs versus Benefits of Mutsho Solar PV3

Environmental costs (including those to the natural environment, economic and social environment) can be anticipated at a local and site-specific level and are considered acceptable provided the mitigation measures as outlined in the EIA Report and the EMPr are implemented and adhered to. No fatal flaws have been identified. These environmental costs could include:

- *Loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for the solar facility* – The cost of loss of biodiversity can be minimised through the implementation of the recommended mitigation measures, including limiting clearance within areas of high sensitivity.
- *Impacts on freshwater resources* - provided that the mitigation is successfully implemented, the specialist is of the opinion that the establishment of the proposed solar facility is unlikely to pose a significant threat to local watercourses with all anticipated impacts having a Low residual risk rating.
- *Impacts on birds*– loss of bird species due to collision with infrastructure and disturbance associated with construction and operation of the facility. Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts..
- *Loss of land for agriculture* – The development will remove areas available for agricultural activities. However, based on the small development footprint of the solar facility and the fact that agricultural potential of the site is low to moderate, this will be limited and not significant.
- *Visual impacts associated with the solar facility/impacts to the sense of place* – Mutsho Solar PV3 will be visible to receptors up to a distance of 3km from the site and mainly of a high significance. No mitigation of this impact is possible (i.e., the structures will be visible in the landscape), but general mitigation and management are required as best practise to minimise secondary visual impacts which may arise from mismanagement of the site.
- *Loss of heritage and palaeontological resources* – based on the outcomes of the Heritage Impact Assessment, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that the recommended buffers are implemented.

Benefits of Mutsho Solar PV3 include the following:

- The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development, supporting the Just Energy Transition in the region. These will persist during the pre-construction, construction, operation and decommissioning phases of the project.
- The project provides an opportunity for a new land use on the affected properties which would result in additional financial benefits to the directly affected landowners through compensation. It is important to note that the construction and operation of a solar facility can occur in tandem with crop production.
- The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy, in line with national policy regarding energy generation.
- The water requirement for a solar facility is negligible compared to the levels of water used by coal-based technologies. This generation technology is therefore supported in dry climatic areas.
- South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. Mutsho Solar PV3 will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of Mutsho Solar PV3 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level can be appropriately managed and minimised, the

benefits of the project are expected to partially offset the localised environmental costs of the solar facility, provided that the mitigation measures, as recommended by the specialists are adhered to.

3. Overall Conclusion (Impact Statement)

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using solar as the preferred technology, due to the availability of a strong solar resource, available grid capacity, benign topography, and good access. A technically viable development footprint was proposed by the developer considering environmental sensitivities identified in the scoping study and assessed as part of the EIA process. The assessment of the development footprint within the project site was undertaken by independent specialists and their findings have informed the results of this EIA 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 specialist findings from the EIA studies undertaken have indicated that there are no identified fatal flaws associated with the implementation of the development footprint within the project site subject to implementation of the recommended mitigation measures. Although the proposed layout for the PV facility and associated infrastructure overlaps with areas of sensitivity, the specialists have concluded that the project as proposed can be authorised on condition that the recommended mitigation measures are implemented. Impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. The layout assessed within this EIA Report is therefore considered to be acceptable for implementation.

As detailed in the cost-benefit analysis, the benefits of Mutsho Solar PV3 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level can be appropriately managed and minimised, the benefits of the project are expected to partially offset the localised environmental costs of the solar facility. From a social perspective, both positive and negative impacts are expected. The implementation of 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 Mutsho Solar PV3.

Through the assessment of the development footprint within the project site, it can be concluded that the development of Mutsho Solar PV3 will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

4. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer and the potential to minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that Mutsho Solar PV3 is acceptable within the landscape and can reasonably be authorised subject to implementation of the refined optimised facility layout and the mitigation and enhancement measures recommended by the specialists.

Mutsho Solar PV3 with a contracted capacity of up to 100MW includes the following infrastructure (to be included within an authorisation issued for the project):

- Solar PV array comprising PV panels and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- 33/132kV onsite substation (IPP Portion), including associated equipment and infrastructure – the onsite substation will be completely constructed as part of phase 1 (i.e., as part of Mutsho Solar PV3) but only equipped for the first 100MW. When such a time comes that the next 100 MW is constructed, the existing substation will be equipped for the additional 100MW generation capacity (i.e., additional transformers, extending the busbars, etc.). This approach will be followed as each 100MW facility is added to the cluster.
- Site offices, warehouses, and guardhouses.
- Water storage tanks at admin block for human consumption.
- Laydown areas.
- Internal gravel distribution roads

The following key conditions would be required to be included within an authorisation issued for Mutsho Solar PV3:

- All mitigation measures detailed within this EIA Report, as well as the specialist reports contained within **Appendices D to L** are to be implemented.
- The EMPrs (for the facility and onsite substation) as contained within **Appendix K** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the solar facility in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of Mutsho Solar PV3 is considered key in achieving the appropriate environmental management standards as detailed for this project.
- Following the final design of Mutsho Solar PV3, a final layout must be submitted to DFFE for review and approval prior to commencing with construction. Micro-siting must take all recommended mitigation measures into consideration. No development is permitted within the identified no-go areas as detailed in **Figure 3**.
- 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 monitor compliance for the duration of the construction phase.
- Preconstruction walk-through of the final development footprint must be undertaken for protected species that would be affected and that can be translocated must be undertaken. The survey must also cover sensitive habitats and species that are required to be avoided. Permits from the relevant provincial authorities, will be required to relocate and/or disturb listed plant species.
- Prevent birds from nesting in substation infrastructure through exclusion covers or spikes if required (determined on a case-by-case basis).
- All other relevant environmental permits must be obtained prior to the construction of the facility.

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

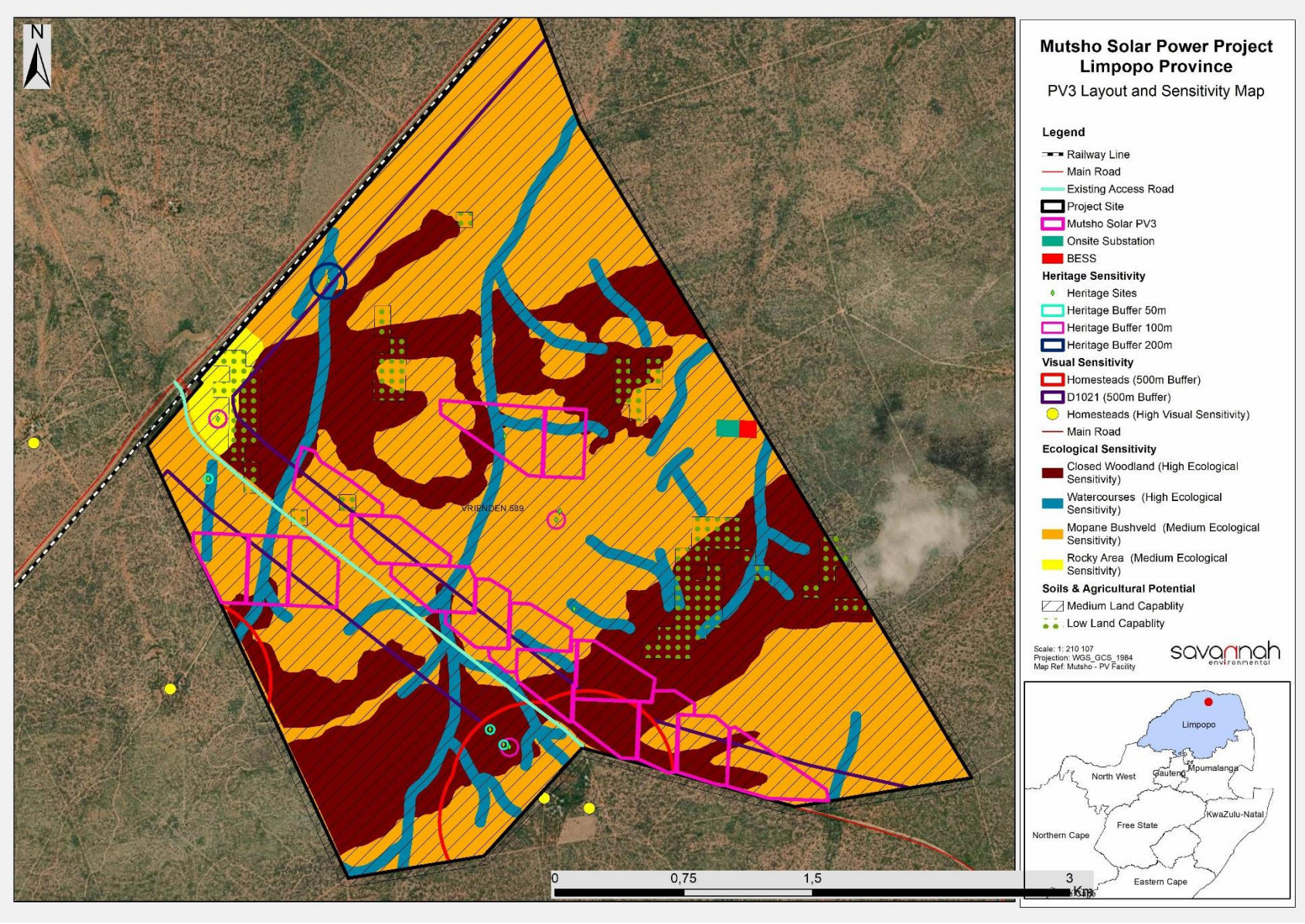

Figure 2: Environmental sensitivity map from the results of the impact evaluation for Mutsho Solar PV3.

DEFINITIONS AND TERMINOLOGY

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

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

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

Commissioning: Commissioning commences once construction is completed.

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

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

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

Development area: The development area is that identified area (located within the project site) where Mutsho Solar PV3 is planned to be located. The development area is still to be determined.

Development footprint: The development footprint is the defined area (located within the development area) where the PV array and other associated infrastructure for Mutsho Solar PV3 is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts

include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

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

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

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

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

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.

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

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

Project site: The project site is the area with an extent of 1 237ha, within which Mutsho Solar PV3 development footprint will be located.

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

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

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

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APPENDICES LIST

CHAPTER 1: INTRODUCTION

Mutsho Power (Pty) Ltd is proposing the construction and operation of a commercial Photovoltaic (PV) Solar Energy Facility and associated infrastructure on the Remaining Extent of Farm Vrienden 589 MS, located approximately 8km south-west of Mopane and 39km south-west of Musina, within the Musina Local Municipality and the Vhembe District Municipality in the Limpopo Province (refer to **Figure1.1**). The facility will have a contracted capacity of up to 100MW and will be known as Mutsho Solar PV3 (refer to **Figure 1.2**). The project is planned as part of a cluster of renewable energy projects, which include three (3) additional 100MW Solar PV Energy Facilities and grid connection infrastructure connecting the facilities to the national grid, with the point of connection being the existing Nzhelele Substation (refer to **Figure 1.3**). It is the developer's intention to develop the projects in a phased approach (i.e., 100MW at a time). The projects are proposed by separate Specialist Purpose Vehicles (SPVs)[3], and are assessed through separate Environmental Impact Assessment (EIA) processes. Similarly, the grid connection solution will be subjected to a separate Basic Assessment (BA) process in order to facilitate handover of this infrastructure to Eskom once constructed.

Mutsho Solar PV3 is proposed in response to the identified objectives of national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid the proposed project under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or a similar private programme, with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP), with the Mutsho Solar PV3 set to inject up to 100MW of electricity into the national grid.

From a regional perspective, the identified area within the Limpopo Province is considered favourable for the development of a commercial Solar PV Energy Facility by virtue of prevailing climatic conditions, relief, the extent of the affected properties, the availability of a direct grid connection (i.e., a point of connection of the national grid) and the availability of land on which the development can take place.

1.1. Requirement for an Environmental Impact Assessment Process

Section 24 of South Africa's National Environmental Management Act (No. 107 of 1998) (NEMA) pertains to Environmental Authorisations (EA), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the Competent Authority (CA). The 2014 Environmental Impact Assessment (EIA) Regulations, as amended (GNR 326), published under the NEMA prescribe the process to be followed when applying for Environmental Authorisation (EA), while the Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)) contain those activities which may not commence without an EA from the CA.

As the project has the potential to impact on the environment, an Environmental Authorisation (EA) is required from the National Department of Forestry, Fisheries and the Environment (DFFE) subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA) process, as prescribed in Regulations 21 and 24 of the 2014 EIA Regulations (GNR 326), as amended. The requirement for EA subject

[3] The development of the various projects under separate SPVs is in accordance with the DMRE's requirements under the REIPPPP.

to the completion of a full S&EIA process is triggered by the inclusion of, amongst others, Activity 1 of Listing Notice 1 (GNR 325), namely:

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

In terms of GNR 779 of 01 July 2016, the DFFE has been determined as the Competent Authority for all projects which relate to the IRP for Electricity 2010 – 2030, and any updates thereto. Through the decision-making process, the DFFE will be supported by the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) as the commenting authority.

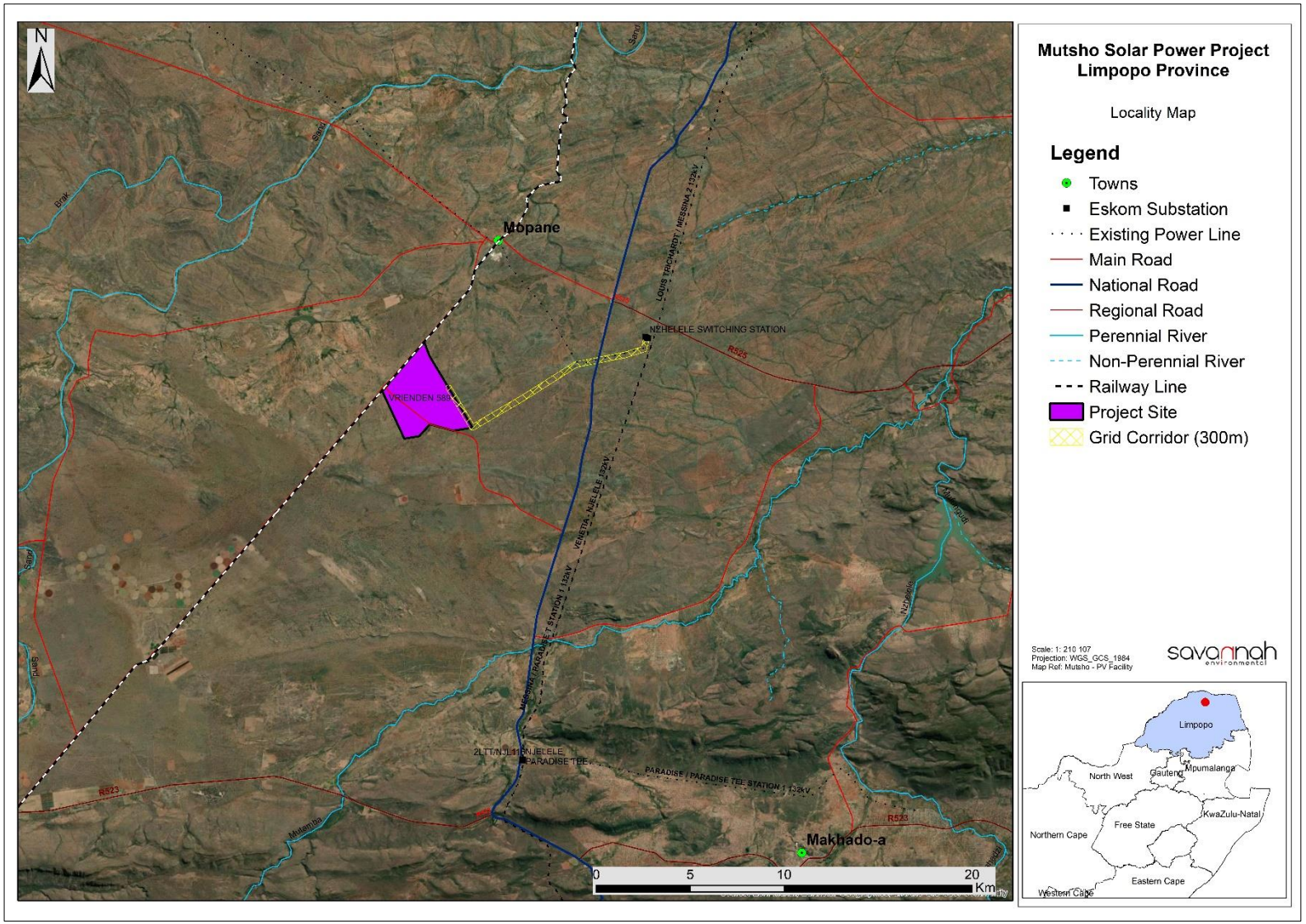

Figure 1.1: Locality map illustrating the site proposed for the cluster of proposed renewable energy facilities that Mutsho Solar PV3 forms part of (also refer to **Appendix L**)

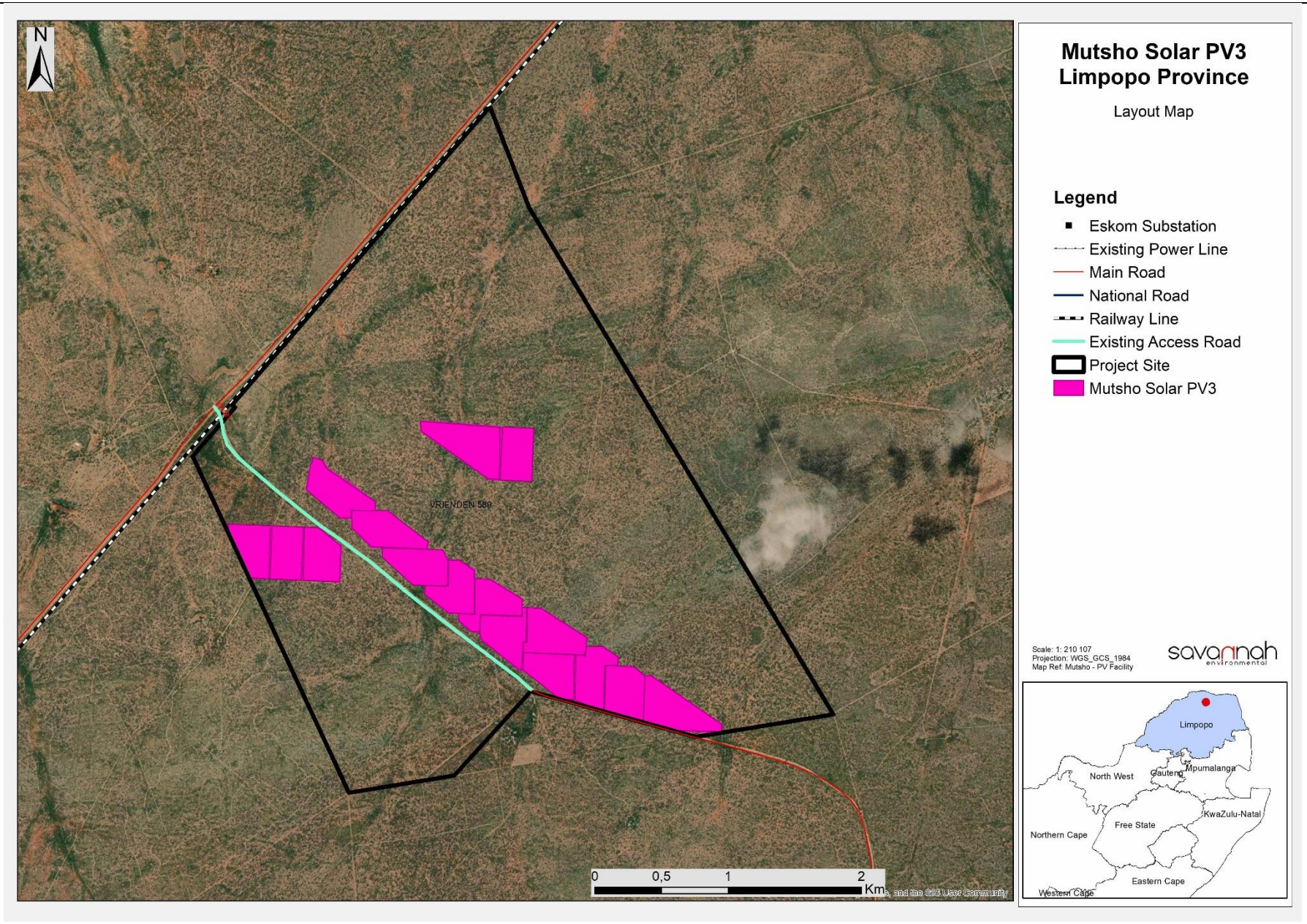

Figure 1.2: Location of Mutsho Solar PV3 within the project site (also refer to **Appendix L**)

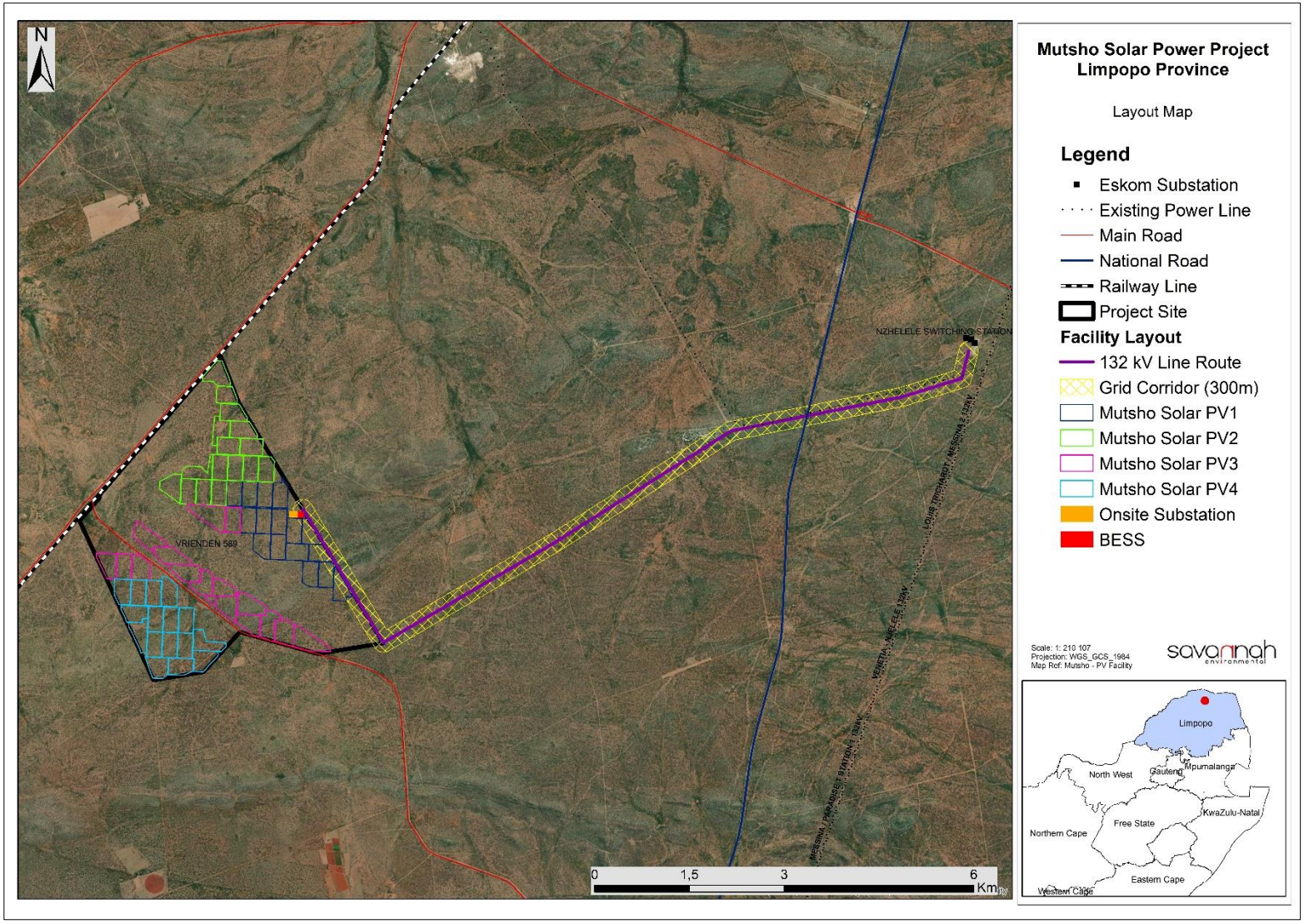

Figure 1.3: The cluster of proposed Solar PV Energy Facilities and grid connection infrastructure that Mutsho Solar PV3 forms part of (also refer to **Appendix L**)

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

This EIA Report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (and amended on 07 April 2017) promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This chapter of the EIA Report includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(a) the details of (i) the EAP who prepared the report and (ii) the expertise of the EAP; including a curriculum vitae.	The details of the EAP and the expertise of the EAP have been included in **section 1.5**. The Curriculum vitae of the Savannah Environmental team have been included as **Appendix A**.
3(1)(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the project site proposed for the development of Mutsho Solar PV3 is included as **Figure 1.1**. The details of the affected properties, including the property names and numbers, as well as the SG-codes are included in **Table 1.1**.
3(1)(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is (i) a linear activity, a description, and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	The locality of the project site is illustrated on a locality map included as **Figure 1.1**. The centre point co-ordinates of the project site are included in **Table 1.1**.

This EIA Report consists of twelve chapters, as follows:

- **Chapter 1** provides background to Mutsho Solar PV3 and the EIA process.
- **Chapter 2** provides a description of the solar PV facility and infrastructure associated with the facility.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** describes solar energy as a power generation option and provides insight to technologies for solar energy.
- **Chapter 5** outlines the strategic regulatory and legal context for energy planning in South Africa, and specifically for the proposed facility.
- **Chapter 6** describes the need and desirability of Mutsho Solar PV3 within the project site.
- **Chapter 7** outlines the process which was followed during the EIA process.
- **Chapter 8** describes the existing biophysical and socio-economic environment affected by the proposed facility.
- **Chapter 9** provides an identification and evaluation of the potential issues associated with the proposed Solar PV Facility and associated infrastructure.
- **Chapter 10** provides a description and assessment of the potential cumulative issues associated with the proposed solar PV facility and associated infrastructure.
- **Chapter 11** presents the conclusions and recommendations based on the findings of the EIA for Mutsho Solar PV3.
- **Chapter 12** provides references used in the compilation of the EIA Report.

1.3. Project Overview

A preferred project site[4] with an extent of ~1237ha and has been identified by Mutsho Power (Pty) Ltd as a technically suitable area for the development of the Mutsho Solar PV3 Facility. A development area of ~277ha has been identified within the project site by the proponent for the development based on the outcome of the specialist assessments within the Scoping Phase of the process and technical considerations. A development footprint[5] has been defined for the project infrastructure within this development footprint.

Table 1.1: Detailed description of the Mutsho PV3 project site

Province	**Limpopo Province**
District Municipality	Vhembe District Municipality
Local Municipality	Musina Local Municipality
Ward Number (s)	Ward 02
Nearest town(s)	Mopane (~8km south-west) and Musina (~39km south-west)
Affected Properties:	Remaining Extent of Farm Vrienden 589 MS (T0MS00000000058900000)
Current zoning	Agriculture
Site Coordinates (centre of affected property/project site)	22°41'27.20"S; 29°49'27.37"E
Site Coordinates (centre of the development area for Mutsho Solar PV3)	22°41'24.13"S; 29°50'9.20"E
Site Coordinates (corner points of affected property/project site)	Corner 1: 22°41'21.30"S; 29°48'15.41"E Corner 2: 22°41'8.85"S; 29°48'25.67"E Corner 3: 22°41'8.30"S; 29°48'24.89"E Corner 4: 22°39'53.24"S; 29°49'26.93"E Corner 5: 22°39'53.39"S; 29°49'27.02"E Corner 6: 22°39'53.01"S; 29°49'27.35"E Corner 7: 22°40'16.51"S; 29°49'38.94"E Corner 8: 22°42'14.12"S; 29°51'5.82"E Corner 9: 22°42'21.52"S; 29°50'30.53"E Corner 10: 22°42'12.91"S; 29°49'46.90"E Corner 11: 22°42'34.27"S; 29°49'28.35"E Corner 12: 22°42'39.95"S; 29°49'1.23"E
Site Coordinates (corner points of the development area for Mutsho Solar PV3)	Corner 1: 22°40'56.11"S; 29°49'35.18"E Corner 2: 22°41'9.06"S; 29°49'35.67"E Corner 3: 22°41'9.82"S; 29°49'43.96"E Corner 4: 22°41'22.44"S; 29°49'44.25"E Corner 5: 22°41'22.34"S; 29°49'51.41"E Corner 6: 22°41'30.99"S; 29°49'51.63"E Corner 7: 22°41'35.10"S; 29°49'58.04"E Corner 8: 22°41'34.80"S; 29°50'19.69"E Corner 9: 22°41'45.64"S; 29°50'19.84"E Corner 10: 22°41'48.15"S; 29°50'24.26"E

[4] The project site is the area with an extent of ~1 237ha, within which the development footprint for Mutsho Solar PV3 will be located.

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

	Corner 11: 22°41'47.71"S; 29°50'36.56"E Corner 12: 22°41'54.01"S; 29°50'36.91"E Corner 13: 22°41'53.59"S; 29°50'44.12"E Corner 14: 22°41'51.67"S; 29°50'44.27"E Corner 15: 22°41'51.81"S; 29°50'47.41"E Corner 16: 22°41'13.12"S; 29°50'20.72"E Corner 17: 22°41'13.24"S; 29°50'9.07"E Corner 18: 22°40'57.61"S; 29°50'8.68"E Corner 19: 22°40'55.69"S; 29°50'7.90"E

During the Scoping Phase, the full extent of the project site was considered by the specialist assessments, with the aim of determining the suitability from an environmental and social perspective and identifying areas that should be avoided in development planning. Based on the specialist assessments undertaken during the Scoping Phase, areas of environmental sensitivity were identified within the project site. In order to avoid these areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, the developer identified a suitable development footprint (~177ha in extent) within the project site where the PV modules and other associated infrastructure for Mutsho PV3 is planned to be constructed. Since the project site assessed during the Scoping Phase is larger than the area required for the development footprint, it provides the opportunity for the optimal placement of the infrastructure, ensuring avoidance of major identified environmental sensitivities.

Infrastructure associated with Mutsho Solar PV3 will include:

- Solar PV array comprising PV panels and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- 33/132kV onsite substation (IPP Portion), including associated equipment and infrastructure – the onsite substation will be completely constructed as part of phase 1 (i.e., as part of Mutsho Solar PV3) but only equipped for the first 100MW. When such a time comes that the next 100 MW is constructed, the existing substation will be equipped for the additional 100MW generation capacity (i.e., additional transformers, extending the busbars, etc.). This approach will be followed as each 100MW facility is added to the cluster.
- Site offices, warehouses, and guardhouses.
- Water storage tanks at admin block for human consumption.
- Laydown areas.
- Internal gravel distribution roads.

The key infrastructure components proposed as part of Mutsho Solar PV3 are described in greater detail in Chapter 2 of this EIA Report.

The overarching objective for Mutsho Solar PV3 is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and maintenance costs, as well as potential social and environmental impacts in accordance with the principles of sustainable development. Local level environmental and planning issues have been assessed through the EIA process with the aid of site-specific specialist studies in order to delineate areas of sensitivity within the project site. These site-specific specialist studies have assisted in informing and optimising the design of the solar facility.

1.4. Overview of the Environmental Impact Assessment (EIA) Process

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues and allows for the resolution of the issues reported on in the Scoping and EIA Reports as well as dialogue with Interested and Affected Parties (I&APs).

The EIA process comprises of two (2) phases (i.e., Scoping and EIA) (refer to **Figure 1.4**) and involves the identification and assessment of potential environmental impacts through the undertaking of independent specialist studies, as well as public participation. The processes followed in these two phases is as follows:

» The **Scoping Phase** includes the identification of potential issues associated with the project through a desktop study (considering existing information), limited field work and consultation with interested and affected parties and key stakeholders. This phase considers the project site in order to identify and delineate any environmental fatal flaws, no-go and / or sensitive areas. Following a public review period of the Scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for the EIA to the Competent Authority for consideration and acceptance. The Scoping Report was accepted, and the Plan of Study for the EIA Phase approved by the DFFE on 21 October 2022.

» The **EIA Phase** involves a detailed assessment of the potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint within the project site and includes detailed specialist investigations as well as public consultation. Following a public review period of the EIA Report, this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the Competent Authority for final review and decision-making.

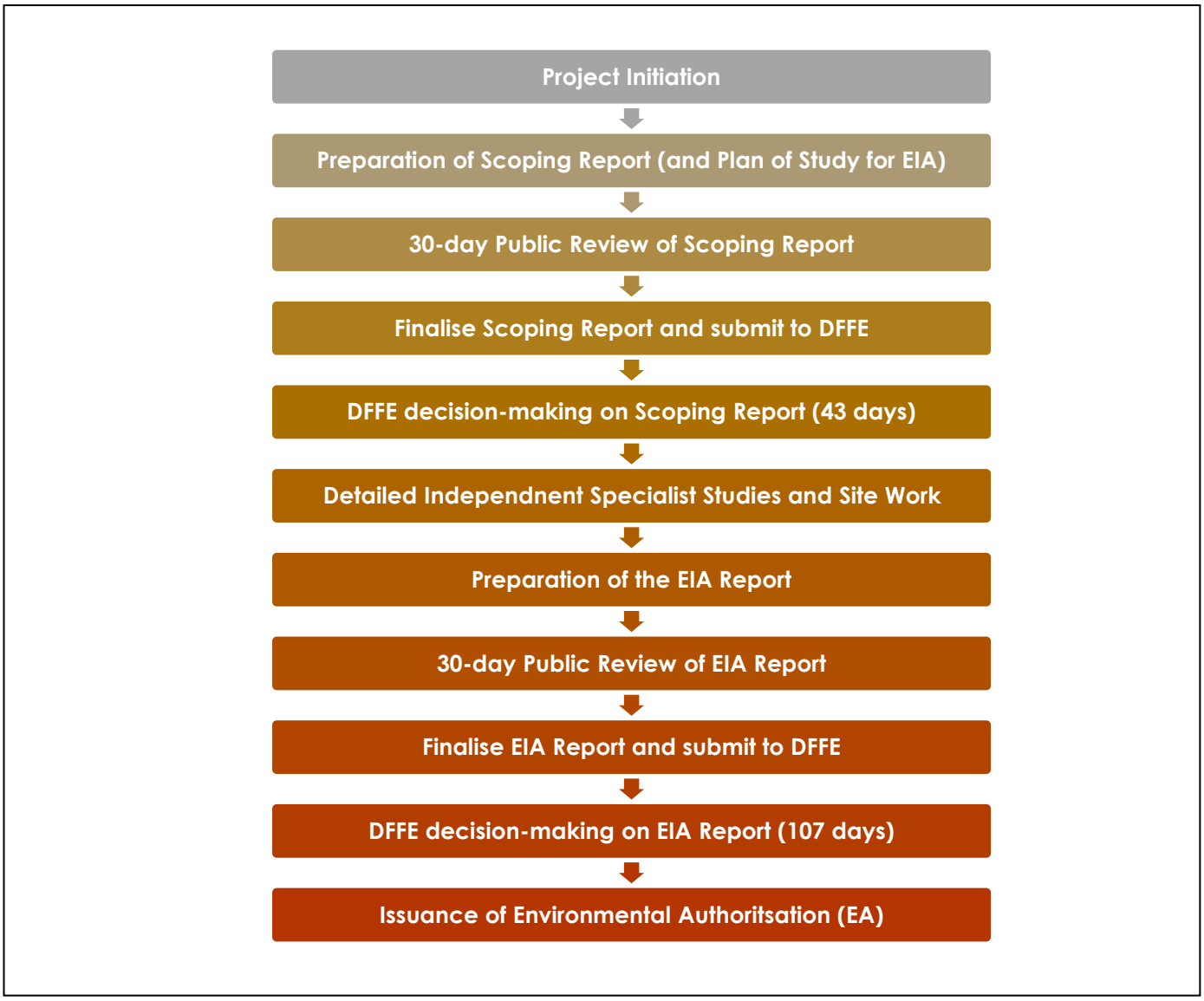

Figure 1.4: Regulated timeframe of an EIA Process

1.5. Details of Environmental Assessment Practitioner and Expertise to conduct the S&EIA Process

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

Neither Savannah Environmental, the Environmental Assessment Practitioners (EAPs) employed by the company nor any of the specialists responsible for undertaking studies for this project are subsidiaries or are affiliated to the applicant. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed facility.

Savannah Environmental is a specialist environmental consulting company providing a holistic environmental management service, including environmental assessment, and planning to ensure

compliance and evaluate the risk of development, and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team have considerable experience in environmental impact assessment processes and environmental management and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa, including those associated with electricity generation from renewable energy sources.

» **Chantelle Geyer,** the principal author of this EIA Report holds a BSc degree in Environmental Science, and a BSc Honours degree in Environmental Geology from the North-West University in Potchefstroom, South Africa. She is a Junior Environmental Consultant and specialises in basic assessments, environmental impact assessments, GIS-mapping, public participation administration, environmental management programmes, and environmental compliance.

» **Jo-Anne Thomas**, the principal EAP on this project, is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726) and a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP). She provides technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Her key focus is on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures.

» **Nicolene Venter**, the principal public participation consultant for this project, is a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

In order to adequately identify and assess potential environmental impacts associated with the proposed Mutsho Solar PV3, the following specialist sub-consultants have provided input into this EIA Report:

Specialist	Area of Expertise
Lindi Steyn and Andrew Husted of The Biodiversity Company	Ecology (including fauna, flora, avifauna, and wetlands)
Matthew Mamera and Andrew Husted of The Biodiversity Company	Soils and Agricultural Potential
Jenna Lavin of CTS Heritage	Heritage (including archaeology, palaeontology, and cultural landscape)
Jon Marshall of Environmental Planning and Design	Visual
Pierre van Jaarsveld of Urban Econ Development Economist (Pty) Ltd	Socio-Economic

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

CHAPTER 2: PROJECT DESCRIPTION

This chapter provides an overview of Mutsho Solar PV3 and details the project scope which includes the planning/design, construction, operation, and decommissioning activities required for the development. It must be noted that the project description presented in this Chapter may change to some extent based on the outcomes and recommendations of detailed engineering and other technical studies, the findings and recommendations of the EIA and supporting specialist studies, and any licencing, permitting, and legislative requirements.

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

This chapter of the EIA Report includes the following information required in terms of the EIA Regulations, 2014, as amended - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including (i) the 21-digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the proposed project is detailed in Chapter 1, **Table 1.1**, as well as **section 2.2.1** below.
3(1)(d)(ii) a description of the scope of the proposed activity, including (ii) a description of the activities to be undertaken including associated structures and infrastructure related to the development.	A description of the activities to be undertaken with the development of project is included in **Table 2.1** and **Table 2.2**.

2.2 Nature and Extent of the Mutsho Solar PV3

In responding to the growing electricity demand within South Africa, the need to promote renewable energy and sustainability, as well as the country's targets for renewable energy, Mutsho Power (Pty) Ltd is proposing the construction and operation of a commercial PV Solar Energy Facility and associated infrastructure to add new capacity to the national electricity grid. Mutsho Solar PV3 will be developed in a single phase and will have a contracted capacity of up to 100MW and will make use of horizontal single-axis tracking PV technology. Monofacial or bifacial panels are both considered within this Environmental Impact Assessment Report.

Mutsho Solar PV3 will comprise solar panels which, once installed, will stand at a height up to ~3m above ground level. The solar panels will include centralised inverter stations mounted above ground, with the Mega Volt (MV) distribution transformers located internally. The main transformer capacity will be up to 160 Mega Volt Ampere (MVA). Centralised inverters and string inverters will both be considered. The final plant configuration selection (i.e., either to use string inverters or centralised inverters) will be made in the detailed design stage.

2.2.1. Overview of the Project Site

The project is to be developed on the Remaining Extent of Farm Vrienden 589 MS, located approximately 8km south-west of Mopane and 39km south-west of Musina, within the Musina Local Municipality and the Vhembe District Municipality in the Limpopo Province. The full extent of the project site (i.e., ~1 237ha) was considered during the Scoping Phase of the EIA process, within which Mutsho Solar PV3 will be appropriately located from a technical and environmental sensitivity perspective.

A development footprint of ~177ha has been identified within the project site and assessed for the construction of the facility and its associated infrastructure. The optimal position for the PV facility was determined taking into consideration the environmental sensitivities identified through the Scoping Study. The PV infrastructure has been appropriately placed to optimise the energy generating potential of the solar resource while also minimising impacts on environmental sensitivities.

Access to the project site is ample with the presence of existing roads mainly consisting of national and regional roads. The project site is located to the west of the N1 national road. The R525 and R523 are located to the north and south the project site, respectively (refer to **Figure 2.1**). The gravel main access roads off the R525, R523 and the N1 (i.e., D777, D744 and D1021) provide direct access to the project site and either option may be utilised to access the project site during the life of the project (refer to **Figure 2.2**).

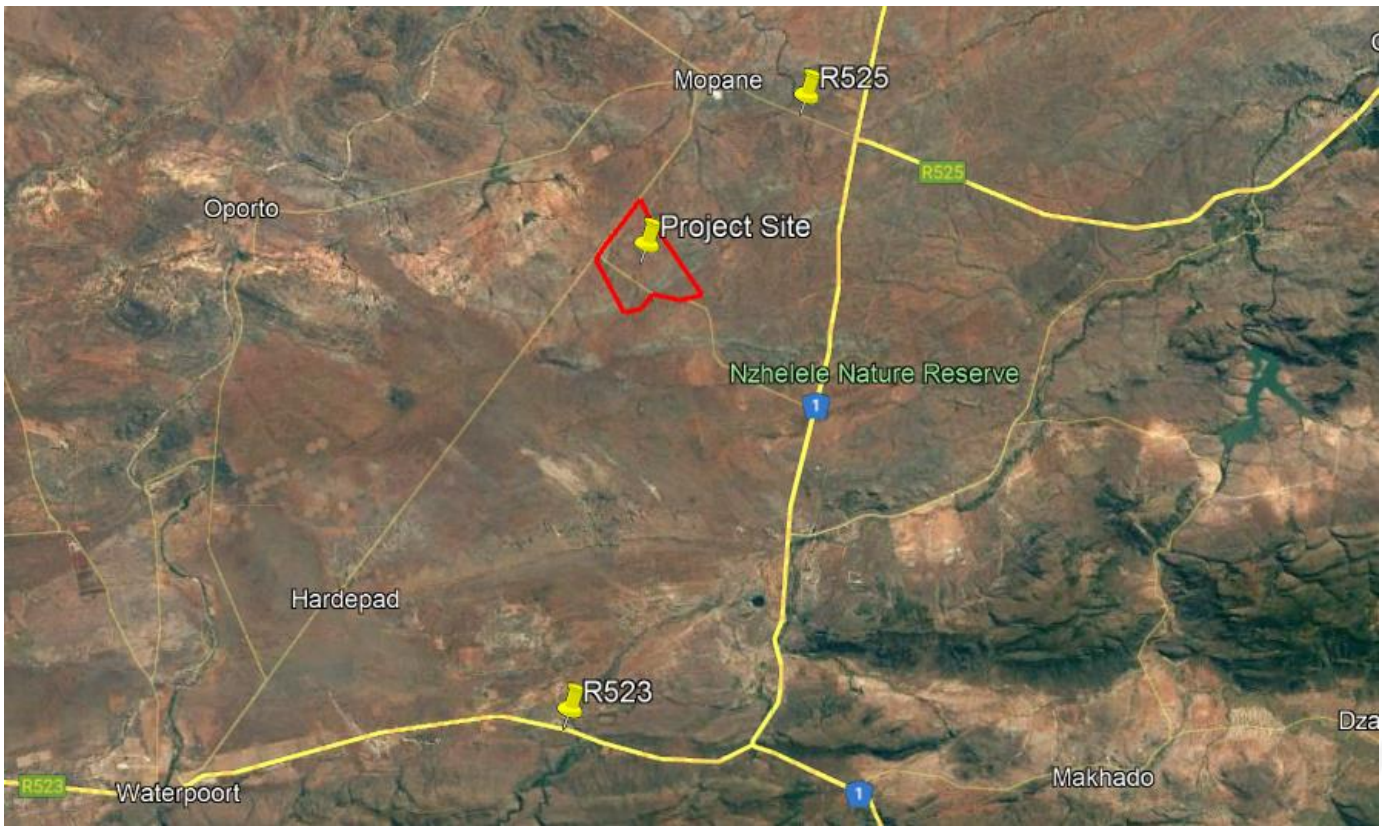

Figure 2.1: Location of the N1 national road, the R525 and R523 in relation to the project site (outline in red) for Mutsho Solar PV3

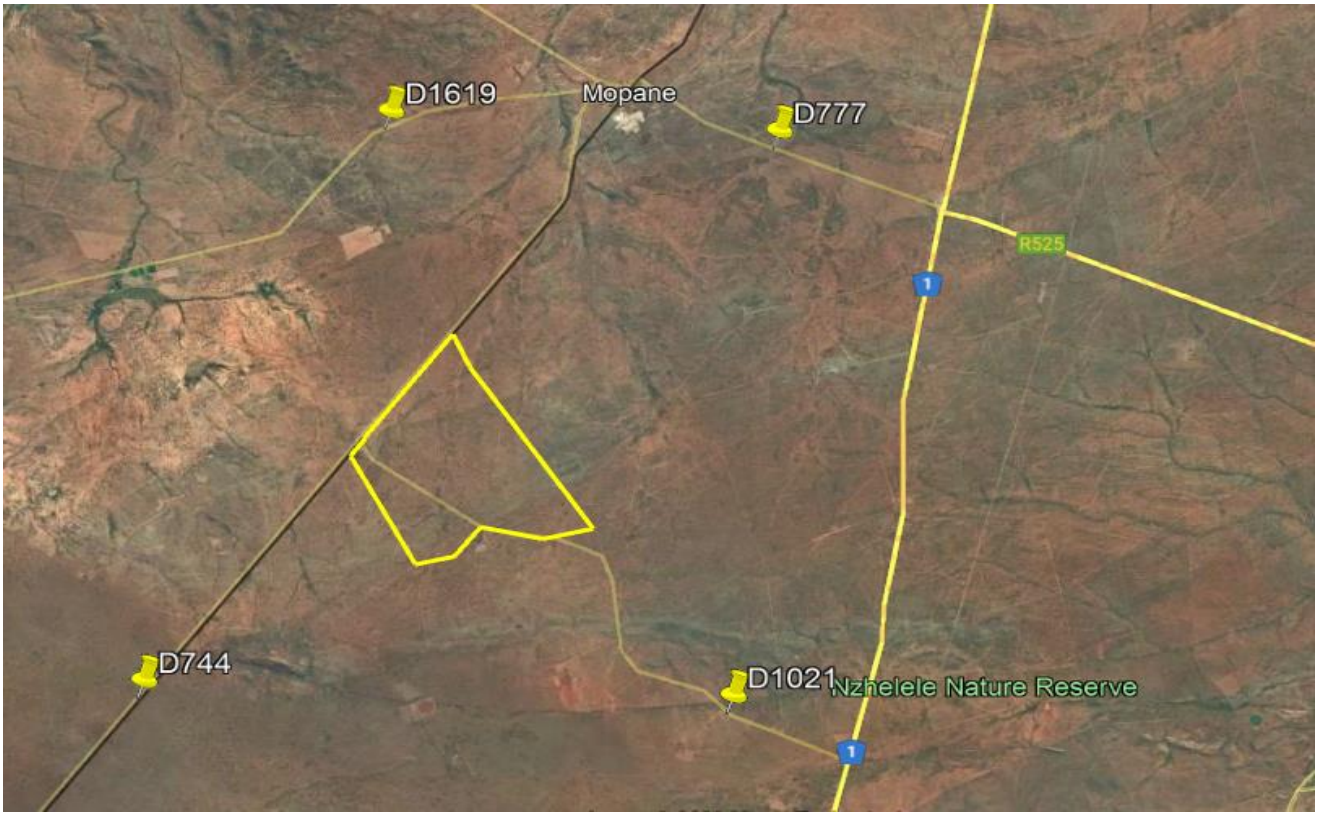

Figure 2.2: Location of the project site (outline in yellow) in relation to the gravel main access roads off the R525, R523 and the N1 (i.e., D777, D744, D1021) which provide direct access to the project site

2.2.2. Components of Mutsho Solar PV3

Infrastructure associated with the Solar PV Energy Facility, which will enable the facility to supply a contracted capacity of up to 100MW, will include

- Solar PV array comprising PV panels and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- 33/132kV onsite substation (IPP Portion), including associated equipment and infrastructure – the onsite substation will be completely constructed as part of phase 1 (i.e., as part of Mutsho Solar PV1) but only equipped for the first 100MW. When such a time comes that the next 100 MW is constructed, the existing substation will be equipped for the additional 100MW generation capacity (i.e., additional transformers, extending the busbars, etc.). This approach will be followed as each 100MW facility is added to the cluster.
- Electrical and auxiliary equipment required at the Collection Station that serves the solar energy facility including a switchyard/bay, control building, fences, etc.
- Site offices, warehouses, and guardhouses.
- Water storage tanks at admin block for human consumption.
- Laydown areas.
- Internal gravel distribution roads

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

Table 2.1: Details or dimensions of typical infrastructure required for the 100MW Mutsho Solar PV3.

Infrastructure	Footprint and dimensions
Number of Panels	Up to ~213 250
Panel Height	Up to ~3m (when panel is horizontal)
Technology	Horizontal single-axis tracking PV technology. Monofacial or bifacial panels are both considered. Central inverters and string inverters are both also considered.
Contracted Capacity	Up to 100MW
Area occupied by the solar array	~177ha
Area occupied by the onsite substation (IPP Portion)	~0.65ha (IPP Portion)
Capacity of onsite substation (IPP Portion)	33kV/132kV
Underground cabling between the PV array and the onsite substation	Underground cabling will be installed at a depth of up to 1.5m to connect the PV array to the onsite substation. The cabling will have a capacity of up to 33kV.
Battery Energy Storage System (BESS)	» Capacity: 40MW/80MWh (for Mutsho Solar PV1) » Footprint: 100mx100m » Proposed technology to be used: Lithium - Ion Battery or Lithium-iron-phosphate Battery or Redox vanadium. * Battery types to be considered: Solid State Batteries and Redox Flow Batteries.
Area occupied by laydown area	0.5ha
Access and internal roads	Existing gravel access roads will be utilised to access the project site. If the width of the existing roads is less than 4m, then it will be widened to 4m to ensure the passage of vehicles. The widened part will be covered with mud and gravel. Internal gravel roads of up to 5km in length and 4.5m in width will be required to access the PV panels and the onsite substation.
Grid connection	The 33/132kV onsite substation (which comprises an IPP Portion and an Eskom Portion) will be connected to the existing Nzhelele Substation via a new 132kV double circuit overhead power line. There will be a single substation location for the entire 4 x 100MW project. The onsite substation will be completely constructed as part of phase 1 but only equipped for the first 100MW. When such a time comes that the next 100MW is constructed, the existing substation will be equipped for the additional 100MW generation capacity (i.e., additional transformers, extending the busbars, etc.). This approach will be followed as each 100MW facility is added to the cluster. The Eskom Portion of the 33/132kV onsite substation and the new 132kV single and double-circuit power line will be assessed as part of a separate Basic Assessment process in support of an application for EA.
Temporary infrastructure	Temporary infrastructure, including laydown areas, will be required during the construction phase. All areas affected by temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.

Table 2.2 provides details regarding the requirements and the activities to be undertaken during the Mutsho Solar PV3 development phases (i.e., construction phase, operation phase and decommissioning phase).

Figure 2.3 provides photographs of the construction phase of a Solar Energy Facility similar to Mutsho Solar PV3.

2.2.3 Project Development Phases Associated with Mutsho Solar PV3

Table 2.2: Details of the Mutsho Solar PV3 project development phases (i.e., construction, operation, and decommissioning)

Pre-construction	
Requirements	» Planning and design of facility.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to a detailed geotechnical survey, site survey and confirmation of the infrastructure micro-siting footprint.
Construction Phase	
Requirements	» Project receives Environmental Authorisation from the DFFE, preferred bidder allocation granted by DMRE, a generating license issued by NERSA, and a Power Purchase Agreement secured with Eskom. » Expected to be up to 18 months for Mutsho Solar PV3. » Create direct construction employment opportunities. It is envisioned that approximately 100 – 150 employment opportunities will be created during the construction of Mutsho Solar PV3. The exact number of employment opportunities to be created will be determined by the progress of construction. » Management staff (less than 20) will be accommodated on site. Construction staff and local labourers will be responsible for sourcing their own accommodation in the nearby villages and towns such as Mopane and Musina. Transport from site to the nearby villages and towns may be provided on a daily basis depending on the number of staff, as well as the distance and routes from site to the nearby villages and towns. » Overnight on-site worker presence would be limited to security staff and management staff. » Waste removal will be undertaken by a suitably qualified sub-contractor. Waste containers, including containers for hazardous waste, will be located at easily accessible location on site when construction activities are undertaken. » During the construction phase, mobile chemical toilets or toilet facilities at the admin block to be established as part of the proposed development will be utilised. Sewage from the admin block toilet facilities will be stored in a conservancy or septic tank. Should a conservancy tank or mobile chemical toilets be utilised, these will be regularly pumped out by a dedicated service provider. » Electricity required for construction activities will be generated by a generator. Where low voltage connections are possible, these will be considered. » Water required for the construction phase either be sourced from drilling wells or supplied by the municipality by water tankers. Water will be used for sanitation and potable water on site as well as for construction works.
Activities to be undertaken	
Establishment of access roads to the Site	» Existing access roads will be utilised to minimise impact. If the width of the existing roads is less than 4m, then these will be widened to 4m to ensure the passage of vehicles. The widened part will be covered with mud and gravel. » Internal gravel roads of up to 5km in length and 4.5m in width will be required to access the PV panels and the onsite substation. The exact location of these internal access roads will be determined by the final micro-sitting or positioning of the PV panels.

Undertake site preparation	» Search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required). » Clearance of vegetation within the development footprint. » Stripping of topsoil to be stockpiled, for use during rehabilitation.
Establishment of laydown areas	» A laydown area for the storage of PV panes components and civil engineering construction equipment will be established. The laydown will also accommodate building materials and equipment associated with the construction of buildings. » No borrow pits will be required. Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas. » If ready-mix cement suppliers are close to site, cement could be directly purchased from them.
Construct foundations	» Excavations to be undertaken mechanically. » For PV array installation, vertical support posts will be driven into the ground. » Depending on geological conditions, the use of alternative foundations may be considered (e.g., screw pile, helical pile, micropile or drilled post/piles).
Transport of components and equipment to and within the site	» The components for the Solar PV Energy Facility and onsite substation will be transported to site by road. 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.
Erect PV Panels	» 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. » 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.
Construct onsite substation (IPP Portion)	The following simplified sequence is conducted for the construction of a substation: » Step 1: Surveying of the development footprint, engaging with affected landowners, environmental specialist walkthroughs to inform permitting requirements. » Step 2: Final design and micro-siting of the infrastructure based on geo-technical, topographical conditions and potential environmental sensitivities. » Step 3: Search-and-rescue activities, vegetation clearance and construction of access roads/tracks (where required), including installation of fencing. » Step 4: Trenching and ground grid conduit installation.

	» Step 5: Installation of concrete foundations. » Step 6: Assembly and installation of steel structures and isolators. » Step 7: Control building assembly. » Step 8: Gravel placement and commissioning. » Step 9: Rehabilitation of disturbed areas. » Step 10: Continued maintenance.
Establishment of ancillary infrastructure	» Site offices and maintenance buildings, guardhouses, warehouses, storage tanks and workshop areas for maintenance and storage will be required. » Establishment will require the clearing of vegetation, levelling, and the excavation of foundations prior to construction.
Connection of PV panels to the onsite substation	» PV arrays to be connected to the on-site substation via underground electrical cables. » Excavation of trenches is required for the installation of the cables. Trenches will be approximately 1.5m deep. » Underground cables are planned to follow the internal access roads, as far as possible.
Connect onsite substation to the power grid	» A new 132kV double circuit power line will run from the onsite substation and tie into the existing Eskom Nzhelele Substation.
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. » On commissioning, access points to the site not required during the operation phase will be closed and prepared for rehabilitation.
<u>Operation Phase</u>	
Requirements	» Duration will be up to 25 years. » Requirements for security and maintenance of the project. » Employment opportunities relating mainly to operation activities and maintenance. The exact number of employment opportunities for the operation phase depends on the requirements of stakeholders. » *Waste* - waste will be minimised, re-used, and recycled as far as practically possible. Where re-use and recycling is not possible, waste will be removed by a sub-contractor or the municipality, where possible, for disposal at a registered facility. Waste containers, including containers for hazardous waste, will be located at easily accessible locations on site. » *Sanitation* – during the operation phase, toilet facilities at the admin block will be utilised. Sewage from the admin block toilet facilities will be stored in a conservancy or septic tank. Should a conservancy tank be utilised, this will be regularly pumped out by a dedicated service provider. » *Water supply* – water will be required for the operation phase for cleaning, fire control and general usage. Water will be sourced from drilling wills or from a registered water services provider such as the municipality.

Activities to be undertaken	
Operation and Maintenance	» Full time security, maintenance, and control room staff. » The PV Facility will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » The PV Facility will be subject to periodic maintenance and inspection. » It is anticipated that the PV panels will be washed twice per month during operation using clean water with no cleaning products, or non-hazardous biodegradable cleaning products. » Disposal of waste products (e.g., oil) to be undertaken in accordance with relevant waste management legislation. » Areas which were disturbed during the construction phase to be utilised, should a laydown area be required during operation.
<u>Decommissioning Phase</u>	
Requirements	» Decommissioning of the Mutsho Solar PV3 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 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	» Confirming the integrity of access to the site to accommodate the required decommissioning equipment. » Preparation of the site (e.g., laydown areas and construction platform). » Mobilisation of construction equipment.
Disassemble and remove PV panels	» Components to be reused, recycled, or disposed of in accordance with regulatory requirements. » Much of the above ground wire, steel, and PV panels of which the system is comprised are recyclable materials and would be recycled to the extent feasible. » Concrete will be removed to a depth as defined by an agricultural specialist and the area rehabilitated. » Cables will be excavated and removed, as may be required

It is expected that the areas of the project site affected by the PV Facility infrastructure (development footprint) will revert back to their original land-use (i.e. agriculture) once Mutsho Solar PV3 has reached the end of its economic life and all infrastructure has been decommissioned.

Figure 2.3: Photographs of the construction phase of a Solar Energy Facility similar to Mutsho PV3 (Source:https://medium.com/@solar.dao/how-to-build-pv-solar-plant-6c9f6a01020f; https://www.shutterstock.com/video/clip-1028794-workers-mounting-panels-on-solar-power-plant-construction; https://www.esi-africa.com/renewable-energy/kenya-construction-solar-farm-gets-green-light/)

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for Mutsho Solar PV3 as part of the S&EIA Process.

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

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

Requirement	Relevant Section
3(1)(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.	The identification and motivation for the preferred project site, the development footprint within the project site, the proposed activity and the proposed technology is included in **Sections 3.3.1, 3.3.3 and 3.3.4**.
3(1)(h)(i) details of the development footprint alternatives considered.	The details of all alternatives considered as part of Mutsho Solar PV3 are included in **Sections 3.3.1 – 3.3.5**.
3(1)(h)(ix) if no alternative development footprint for the activity were investigated, the motivation for not considering such.	The site selection process followed by the developer in order to identify the preferred project site and development footprint is described in **Section 3.3.1**.
3(1)(h)(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	Where no alternatives have been considered, motivation has been included. This is included in **Section 3.3**.

3.2 Alternatives Considered as part of the Scoping and EIA Process

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

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

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

In this instance, 'the project' refers to Mutsho Solar PV3, a solar energy facility with capacity of up to 100MW and associated infrastructure proposed to be developed by an Independent Power Producer (IPP) and intended to form part of the DMRE's REIPPP Programme, or similar programme.

3.2.1 Consideration of Fundamentally Different Alternatives

The applicant is an Independent Power Producer and is therefore only considering power generation developments for the proposed site. 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)[6], and will continue to be addressed as part of future revisions. In this regard, the need for renewable energy power generation from solar PV facilities has been identified as part of the technology mix for power generation in the country for the next 20 years. Of particular relevance to the proposed project is the allocation of 6000MW of new capacity to large scale PV in the period up to 2030 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, land availability and topography (as detailed in the sections below). Therefore, fundamentally different alternatives to the proposed project are not considered within this EIA process.

3.2.2 Consideration of Incrementally Different Alternatives

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

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

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

The sections below describe the incrementally different alternatives being considered as part of Mutsho Solar PV3. Where no alternative is being considered, a motivation has been provided as required by the EIA Regulations, 2014, as amended.

3.3 Project Alternatives under Consideration for Mutsho Solar PV3

An overview of the alternatives being considered for this project is detailed in the sections which follow.

3.3.1. Property or Location Alternatives

The placement of a Solar PV Energy Facility is dependent on several factors, namely, land suitability, climatic conditions (solar irradiation levels), topography, the location and extent of the project site, availability of grid connection infrastructure, and the need and desirability of the project. Mutsho Power (Pty) Ltd considers the preferred property and site location as being highly favourable and suitable from a technical perspective to establish a Solar PV Facility due to the following site-specific favourable characteristics:

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

» **Solar resource**: Solar resource is the first main driver of site selection and property viability when considering the development of Solar PV Energy Facilities. The economic viability of a Solar PV Energy Facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Global Horizon Irradiation (GHI) for the study area is in the region of approximately 2045 – 2118kWh/m²/annum (refer to **Figure 3.1**). Based on the solar resource available, no alternative locations are considered.

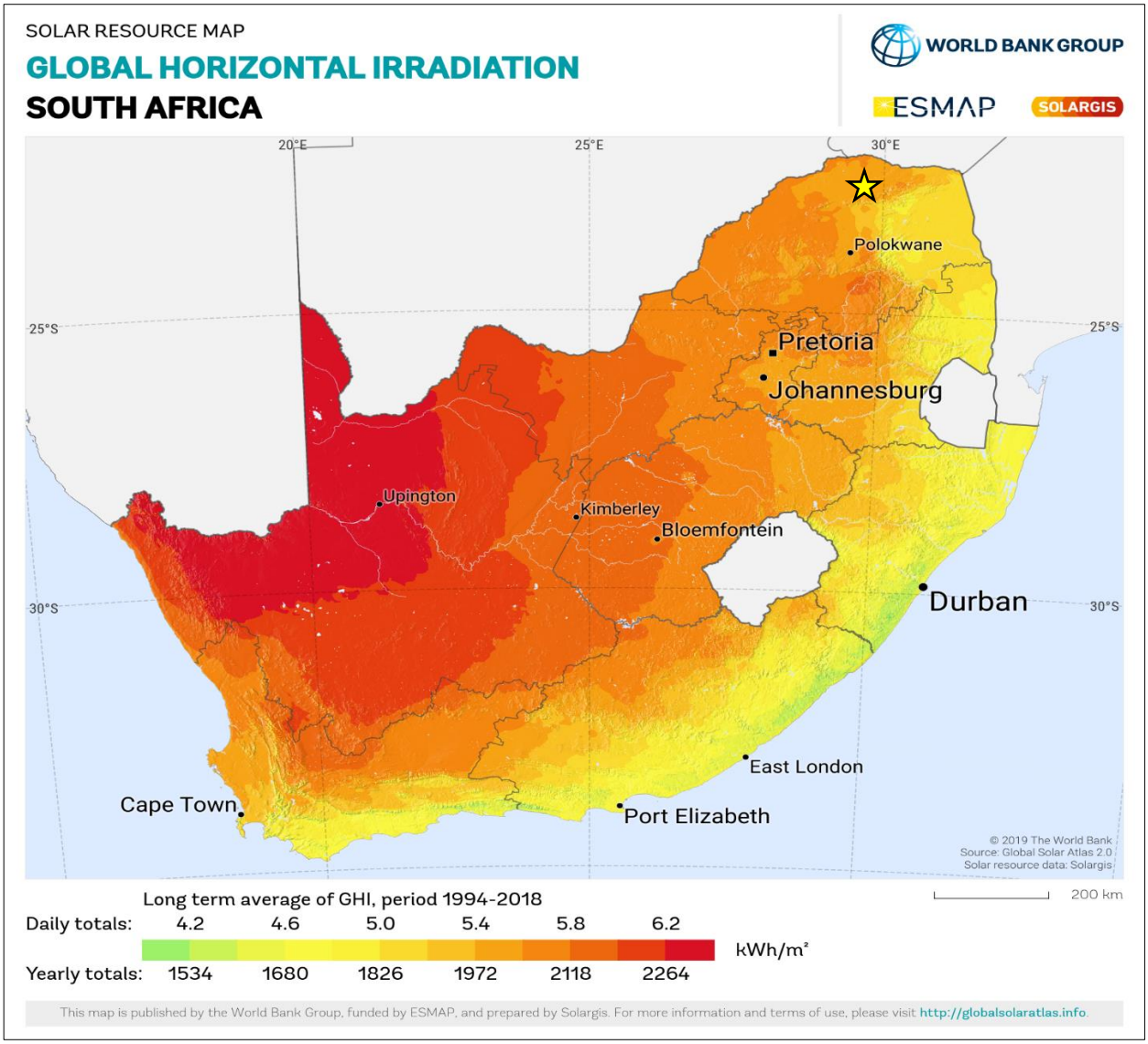

Figure 3.1: Solar irradiation map for South Africa; the position of the proposed Mutsho Solar PV3 is shown by the yellow star on the map. (Source: adapted from Global Solar Atlas 2.0, 2019).

» **Topographical Considerations:** The topographical heterogeneity of the site is described as low with relatively flat topography. No significant topographical features have been observed within the project site. The site lies at an elevation of approximately 700m above mean sea level (amsl), with the highest point located in the southern extent of the site. The site is situated in a virtually flat terrain, with slopes of less than 2%. Only minor undulations and localised topographical variances in the form of small, non-perennial streams occur within the area. Sites that facilitate easy construction conditions (i.e., relatively

flat topography, lack of major rock outcrops etc.) are favoured during the site selection process for a Solar PV Energy Facility, and the project site fits this criterion.

» **Latitude of the site:** At higher latitudes, the angle of irradiation is smaller, causing energy to be spread over a large area of the surface, resulting in cooler temperatures. At lower latitudes (i.e., between 20° and 30°), the sun is higher in the sky, causing energy to be spread over a small area of the surface, resulting in warmer temperatures. The project site is located at a latitude of 22° 44' 33.30" S, which means that it receives high amounts of solar energy, making it suitable for the development of a Solar PV Energy Facility.

» **Local climate considerations:** Cloudy weather has a negative effect on solar power production as clouds reduce the amount of sunlight that reaches solar panels. Clouds tend to form where air rises, and descending air inhibit cloud formation. Since air descends between latitudes of 15° and 30° north and south of the equator, clouds are rare in areas located at these latitudes. The project site is located at a latitude of 22° 44' 33.30" S, which means cloud occurrence is rare in the area and there is therefore unlikely that there would be cloudy weather in the area that would reduce the amount of sunlight that reaches the solar panels.

» **Land Availability**: In order to develop Mutsho Solar PV3, with a contracted capacity of up to 100MW, sufficient space is required. The property included in the project site (i.e., the Remaining Extent of Farm Vrienden 589 MS) is a privately-owned land parcel available in the area which can be used for a development of this nature through agreement with the landowner. The affected property has an extent of ~1 237ha, which was considered by the developer as sufficient for the development of Mutsho Solar PV3. An exact development footprint within the project site for the placement of infrastructure has been identified and assessed within the EIA process considering environmental constraints and sensitivities.

» **Land Use and Suitability**: The current land use of the project site is an important consideration in site selection to limit disruption of existing land use parcels. The Musina Local Municipality is approximately 758 000ha in extent, of which approximately 717 000ha (equivalent to 94.59%) remains untransformed (BGIS, 2015). The general region within which the project site is located can be classified as being definitively rural, with very little anthropogenic development and/or transformed environments. There is no evidence of livestock or game farming, nor recent rainfed crop production within the project site. The land use character of the region within which the project site is located is preferred for a development of this nature as the development will not conflict with the current land use. The project site compliments the proposed land use by repurposing undeveloped land with an economically viable land use.

» **Landowner Support:** The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The landowner of the property affected by the proposed Mutsho Solar PV3 does not view the development as a conflict with their current or planned land use practices. The support from the landowner for the development to be undertaken on the affected property has been solidified by the provision of consent for the project to proceed on the property through the signing of a consent form.

» **Site Access**: Access to the project site is ample with the presence of existing roads mainly consisting of national and regional roads. The project site is located to the east of the N1 national road. The R525 and

R523 are located to the north and south the project site, respectively. The gravel main access roads off the R525, R523 and the N1 (i.e., D777, D744 and D1021) provide direct access to the project site and either option may be utilised to access the project site during the life of the project (refer to **Figure 3.2**).

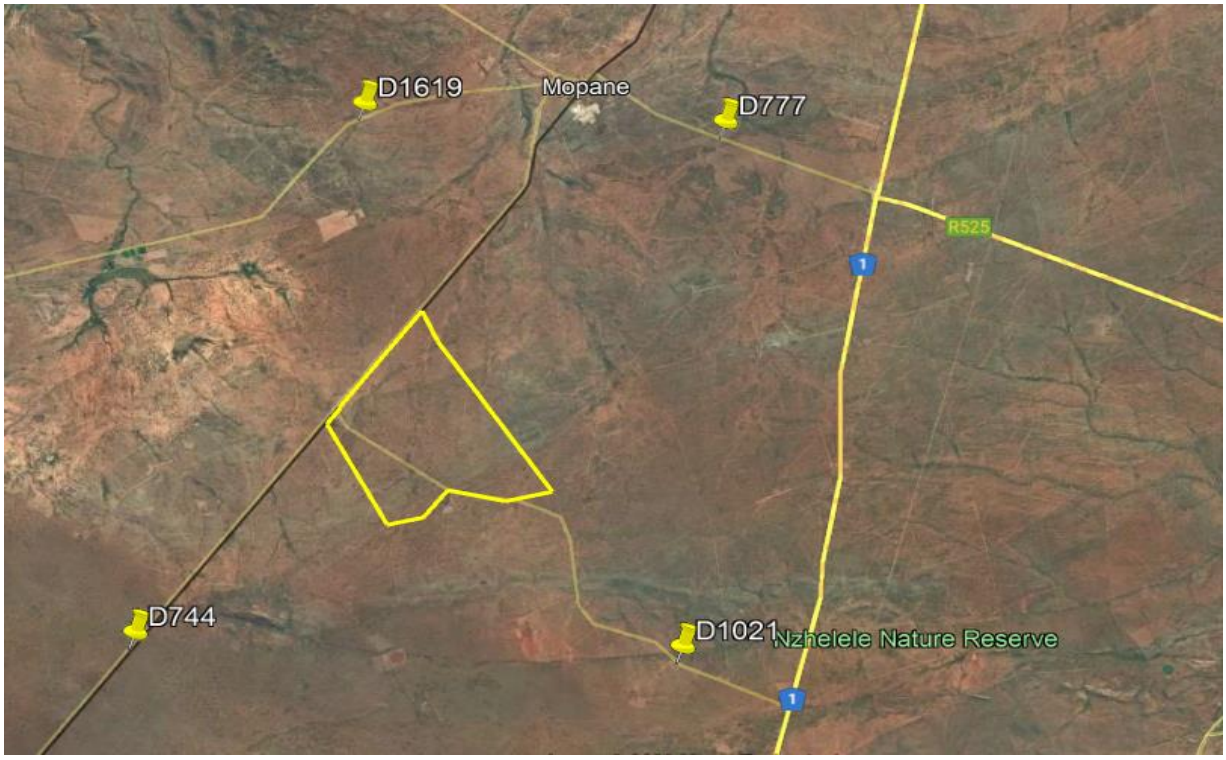

Figure 3.2: Location of the project site (outline in yellow) in relation to the gravel main access roads off the R525, R523 and the N1 (i.e., D777, D744, D1021) which provide direct access to the project site

» **Access to the National Electricity Grid**: A key factor in the siting of any power generation project is a viable grid connection. The anticipated grid connection solution (subject to a separate environmental assessment and authorisation process) is a 132kV onsite substation (comprising an IPP and Eskom Portion), and a 132kV double circuit overhead power line from the onsite substation to the existing Eskom-owned Nzhelele Substation. The developer has consulted with the Eskom network planners to understand the current capacity of the existing grid connection infrastructure and to identify feasible connection points for Mutsho Solar PV3, including the additional three (3) 100MW Solar PV Facilities proposed within the cluster that Mutsho Solar PV3 forms part. Through consultation with the Eskom network planners, it was determined that the existing Nzhelele Substation, which is currently the only preferred point of connection for the cluster, can only accommodate a capacity of 300MW, which is less than the 400MW that will be generated by the Mutsho Cluster of Solar PV Energy Facilities. The remaining 100MW project will therefore only be constructed and connected to the national grid once the necessary upgrades (i.e., additional transformers, extending the busbars, etc) have been conducted at the existing Nzhelele Substation to allow the substation to take on more capacity.

Based on the above considerations, the project site for Mutsho Solar PV3 was identified by the developer as being the most technically feasible and viable project site within the broader area for further investigation in support of an application for authorisation. As a result, no property/location alternatives are proposed as part of this Scoping and EIA process.

3.3.2. Design and Layout Alternatives

The overall aim of the facility layout (i.e., development footprint) is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operation, and maintenance costs, and social and environmental impacts.

Following the confirmation of the Mutsho PV3 preferred project site as being technically feasible for the development of a Solar Energy Facility, the developer commenced with the scoping assessment of the site to evaluate the main constraints and opportunities and determine whether or not there are any fatal flaws or significant no-go areas within the site that might compromise or limit the development of Mutsho PV3 and the potential to generate 100MW. The scoping process included specialist investigations of the project site based on desktop studies and where possible, field assessments. The purpose of this phase of the project was to identify sensitive and no-go areas, as well as to determine appropriate buffers to be considered within the development of the project layout. The sensitivity spatial data as compiled by the specialist team during the Scoping Phase for the project site was provided to the applicant for consideration in the determination of the development footprint. This is a common approach in the development of renewable energy projects in order to inform the placement of infrastructure for further investigation in the EIA Phase.

Through integration of the specialist sensitivity data, as well as consideration of technical aspects, the developer designed the layout to avoid areas and features of high environmental sensitivity. Where avoidance was not possible, appropriate mitigation and management measures (in this instance the development of technical mitigation solutions as well as recommendations from the various environmental specialists) have been proposed for implementation during the construction and operation of the proposed Solar Energy Facility. This has resulted in the consideration of a development footprint of 177ha as part of the EIA process which is designated to be environmentally appropriate as far as possible.

An overall environmental sensitivity map has been provided in order to illustrate the sensitive environmental features located within the project site which needs to be considered and, in some instances completely avoided by the development footprint (refer to Chapter 11).

3.3.3. Activity Alternatives

Mutsho Power (Pty) Ltd is an IPP and as such is only considering renewable energy activities in accordance with the need for such development as identified within the IRP. Power generation is therefore the only activity considered for implementation on the identified site.

3.3.4. Technology Alternatives

The project site was previously considered for the development of a coal-fired power station. Through the environmental impact assessment undertaken for the project (Savannah Environmental, 2018), a number of environmental impacts were identified to be associated with the development of a coal-fired power station, the most significant of which included impacts on climate change. The applicant determined that this proposed technology was undesirable and is therefore only considering the implementation of a renewable energy development. The project site lacks sufficient wind resource suitable for the development of a wind farm. The Integrated Resource Plan (IRP) 2019, excludes the procurement of power from CSP facilities until 2030; whereas new additional capacity of approximately 6 000MW will be required from Solar PV Facilities.

Solar PV consists of a lower visual profile and limited water requirements when compared to the CSP technology option. On this basis, only solar PV technology is being considered for the project site.

Few technology options are available for solar facilities. 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.

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

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

The primary difference between PV technologies available relate to the extent of the facility, as well as the height of the facility (visual impacts), however the potential for environmental impacts remains similar in magnitude. Fixed mounted PV systems are able to occupy a smaller extent and have a lower height when compared to tracking PV systems, which require both a larger extent of land, and are taller in height. However, both options are considered to be acceptable for implementation from an environmental perspective.

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 Scoping and EIA process, Mutsho Power (Pty) Ltd will consider various solar panel options. The preferred option will be informed by efficiency as well as environmental impact and constraints (such as sensitive biophysical features). The PV panels proposed, will comprise solar panels which once installed, will stand less than 5m above ground level. The solar panels will include centralised inverter stations, or string inverters mounted above ground.

3.3.5. The 'Do-Nothing' Alternative

The 'Do-Nothing' alternative is the option of not constructing Mutsho Solar PV3. Should this alternative be selected, there would be no environmental impacts or benefits as a result of construction and operation activities associated with a solar PV facility. The 'do-nothing' alternative will therefore likely result in minimising the cumulative impact on the land, although it is expected that pressure to develop the site for renewable energy purposes will be actively pursued due to the same factors which make the site a viable option for renewable energy development. The 'do-nothing' alternative has been assessed as part of the EIA Phase (refer to Chapters 9 and 11 of this EIA Report).

CHAPTER 4: SOLAR AS A POWER GENERATION TECHNOLOGY

Environmental pollution and the emission of CO_2 from the combustion of fossil fuels through the implementation of conventional power plants constitute a threat to the environment. The use of fossil fuels is reportedly responsible for ~70% of greenhouse gas emissions worldwide. The approach to addressing climate change needs to include a shift in the way that energy is generated and consumed. Worldwide, many solutions and approaches are being developed to reduce emissions. However, it is important to acknowledge that the most cost-effective solution in the short-term is not necessarily the least expensive long-term solution. This holds true not only for direct project costs, but also indirect project costs such as impacts on the environment. Renewable energy is considered a 'clean source of energy' with the potential to contribute greatly to a more ecologically, socially, and economically sustainable future. The challenge however is to ensure that solar energy projects are able to meet all economic, social and environmental sustainability criteria through the appropriate placement of these facilities.

This chapter explores the use of solar energy as a means of power generation.

4.1. Solar PV Technology

Solar energy facilities, such as those which utilise PV technology, use 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:

Photovoltaic Modules

PV cells are made of crystalline silicon, the commercially predominant PV technology, that includes materials such as polycrystalline and monocrystalline silicon or thin film modules manufactured from a chemical ink compound. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV module (Solar Panel). Each PV cell is positively charged on one side and negatively charged on the opposite side, with electrical conductors attached to either side to form a circuit. This circuit captures the released electrons in the form of an electric current (i.e., Direct Current (DC)). When sunlight hits the PV panels, free electrons are released and flow through the panels to produce direct electrical (DC) current. DC then needs to be converted to alternating current (AC) using an inverter before it can be directly fed into the electrical grid.

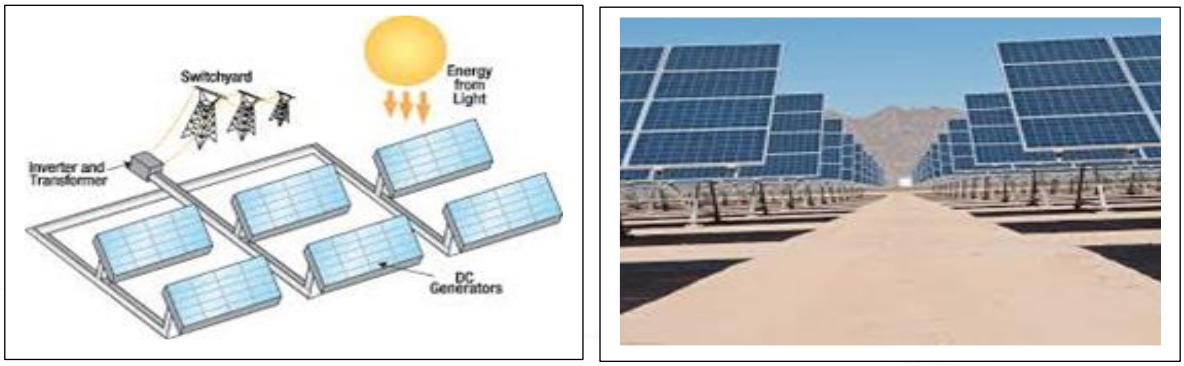

Figure 4.1: Overview of a PV cell, module, and array / panel (Source: pveducation.com)

Inverters

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

Support Structures

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

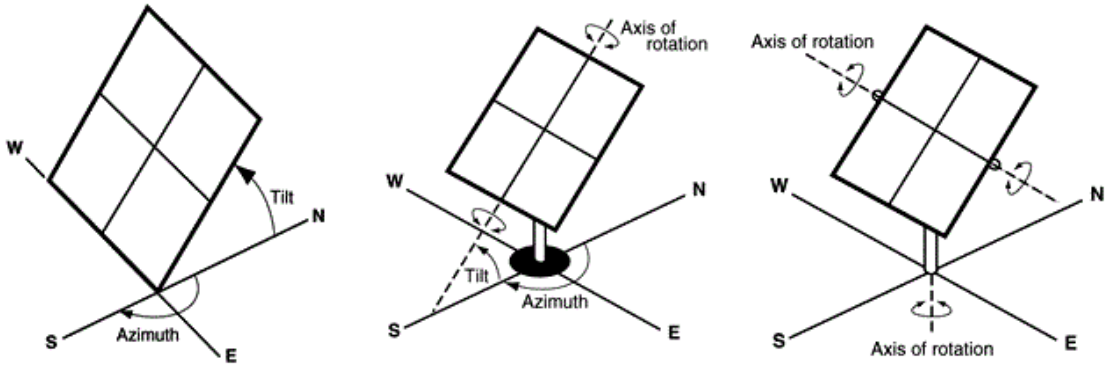

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Figure 4.2: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com))

4.1.1. Bifacial and Monofacial Solar Panel Technology

Bifacial ("two-faced") modules produce solar power from both sides of the panel. Bifacial solar panels have solar cells on both sides, which enables the panels to absorb light from the back and the front (refer to **Figure 4.3**). 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 so as to capture a big fraction of the reflected irradiation. Use of trackers is recommended so the modules can track the sun's movement across the sky, enabling them to stay directed to receive the maximum possible sunlight to generate power.

Monofacial solar panels capture sunlight on one light-absorbing side. The light energy that cannot be captured is simply reflected away (refer to **Figure 4.3**).

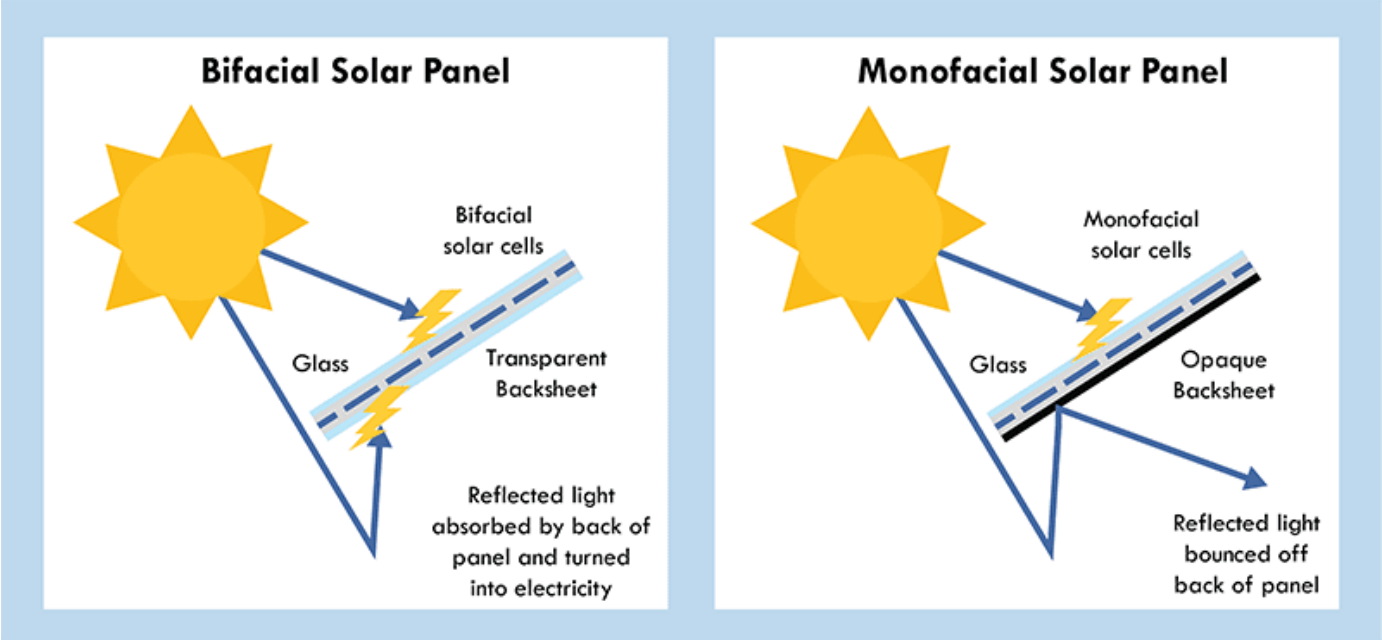

Figure 4.3: Diagram showing how bifacial and monofacial Solar PV panels work (Source: https://www.solarkobo.com/post/bifacial-solar-panels)

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

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CHAPTER 5: 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 Mutsho Solar PV3, is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process which may be applicable to or have bearing on the proposed project.

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

This chapter of the EIA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(e) a description of the policy and legislative context within which the development is proposed and how the proposed development complies with and responds to the legislation and policy context.	Chapter 5 provides an overview of the policy and legislative context which is considered to be associated with the development of the solar energy facility. The regulatory and planning context has been considered at national, provincial and local levels. A description of the policy and legislative context within which Mutsho Solar PV3 is proposed is included in **sections 5.3, 5.4, 5.5** and **5.6.**

5.2. Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Mineral Resources and Energy (DMRE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as a solar energy facility is illustrated in **Figure 5.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of Mutsho Solar PV3.

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

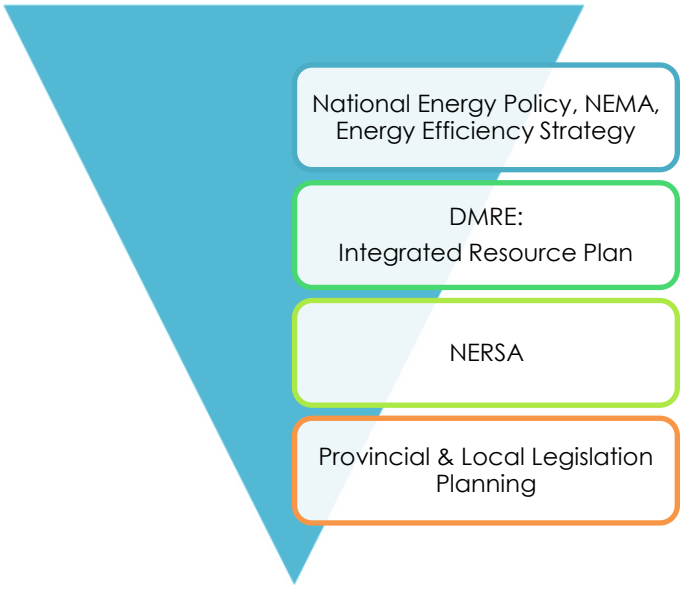


Figure 5.1: Hierarchy of electricity and planning documents

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

- **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity. Furthermore, the Department is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resources that may occur within the project site and development area.
- **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
- **Department of Forestry, Fisheries and the Environment (DFFE):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GN R326) as amended. DFFE is the Competent Authority for this project (as per GN R779 of 01 July 2016), and is charged with granting the EA for the project under consideration. This Department is also responsible for issuing permits for impacts on protected trees.
- **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 resource 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 License (WUL) and General Authorisation).
- **The Department of Agriculture, Rural Development and Land Reform (DARDLR):** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector. Furthermore, the Department is also

responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).

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

- **Limpopo Department of Economic Development, Environment and Tourism (LDEDET):** This Department is the commenting authority for the EIA process for the project and is responsible for issuing of biodiversity and conservation-related permits.
- **Limpopo Department of Public Works, Roads and Infrastructure:** This Department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- **Limpopo Provincial Heritage Resources Authority (LIHRA):** The LIHRA is responsible for the identification, conservation and management of heritage resources in the province, as well as commenting on heritage related issues in Limpopo 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 Limpopo Province, both the local and district municipalities play a role. The local municipality includes the **Musina Local Municipality** which forms part of the **Vhembe District Municipality**. In terms of the Municipal Systems Act (No. 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

5.3. International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of the Mutsho Solar PV3 project are provided below in **Table 5.1**. Mutsho Solar PV3 is considered to be aligned with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 5.1: International policies relevant to Mutsho Solar PV3

Relevant policy	Relevance to Mutsho Solar PV3
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	The Conference of the Parties (COP), established by Article 7 of the UNFCCC, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention. The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. 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 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 on 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

Relevant policy	Relevance to Mutsho Solar PV3
	concluded in Glasgow with all countries agreeing the Glasgow Climate Pact to keep 1.5˚C alive and finalise the outstanding elements of the Paris Agreement. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for the Project which will contribute to managing climate change impacts and assist in reducing GHG emissions in a sustainable manner.
The Equator Principles IV (October 2020)	The Equator Principles (EPs) IV 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. In addition, these principles are used to ensure that projects financed by the Equator Principles Financial Institutions (EPFI) are developed in a manner that is socially responsible and reflects sound environmental management practices. The EPs are applicable to infrastructure projects (such as the proposed Project) and apply globally to all industry sectors. Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the Project. In terms of the EPs, South Africa is a non-designated country (as at 4 March 2020), and as such the assessment process for projects located in South Africa evaluates compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability, and Environmental Health and Safety (EHS) Guidelines. The Project is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended, published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.
International Finance Corporation (IFC) Performance Standards and Environmental and Social Sustainability (January 2012)	The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012. Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an Environmental and Social Management System (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

Relevant policy	Relevance to Mutsho Solar PV3
	Standards 2 through 8 establish specific requirements to avoid, reduce, mitigate or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the project developer is required to manage them through its ESMS consistent with Performance Standard 1. Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project (see box 1 below). • Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts • Performance Standard 2: Labour and Working Conditions • Performance Standard 3: Resource Efficiency and Pollution Prevention • Performance Standard 4: Community Health, Safety and Security • ~~Performance Standard 5: Land Acquisition and Involuntary Resettlement~~ – N/A • Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources • ~~Performance Standard 7: Indigenous Peoples~~ – N/A • Performance Standard 8: Cultural Heritage

5.4. National Policy and Planning Context

Further to the South African government's commitment in August 2011 to support the development of renewable energy capacity, the DMRE initiated the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) to procure renewable energy from the private sector in a series of rounds. According to the IPP Procurement Programme overview report (2021), as at March 2021, 6 422MW of renewable energy capacity from 112 independent power producers (IPPs) has been procured in seven bid rounds[7], with 5 078MW from 79 IPP projects operational and made available to the grid[8]. National policies have to be considered for the construction and operation of the Solar Energy Facility to ensure that the development is in line with the planning of the country.

A brief review of the most relevant national policies is provided below in **Table 5.2**. The development of Mutsho Solar PV3 is considered to align with the aims of these policies, even where contributions to achieving the goals therein are only minor.

7 Bid windows1, 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. 860MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 5 in December 2022.

[8]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

Table 5.2: Relevant national legislation and policies for Mutsho Solar PV3

Relevant legislation or policy	Relevance to Mutsho Solar PV3
Constitution of the Republic of South Africa, 1996	Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts. The undertaking of an EIA process for the proposed project in terms of the requirements of the EIA Regulations, 2014 (as amended), aims to minimise any impacts on the natural and social environment.
National Environmental Management Act (No. 107 of 1998) (NEMA)	This piece of legislation is South Africa's key piece of environmental legislation and sets the framework for environmental management in South Africa. NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being as contained within the Bill of Rights. The national environmental management principles state that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment. The Project is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended, published in terms of Section 24(5) of NEMA. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed. The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.
National Energy Act (No. 34 of 2008)	The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking into account 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 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. The Act also provides for licences and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated. The development of Mutsho Solar PV3 will have to ensure

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	compliance with this Act as a license for the generation of electricity from NERSA will be required.
White Paper on the Energy Policy of the Republic of South Africa (1998)	The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of renewable energy and encouraging new entries into the generation market. The policy states that the advantages of renewable energy include, minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include higher capital costs in some cases, lower energy densities, and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	The White Paper on Renewable Energy Policy Supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of renewable energy and aims to create the necessary conditions for the development and commercial implementation of renewable energy technologies. The White Paper on renewable energy sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing renewable energy in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and accessible and affordable coal resources. However, massive renewable energy resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The development of additional renewable energy projects will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix.
The Electricity Regulation Act (No. of 2006)	The Electricity Regulation Act of 2006, replaced the Electricity Act (No. 41 of 1987), as amended, except for Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator (NERSA) as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which the generation, transmission, distribution, trading, and import and export of electricity are regulated.
National Development Plan 2030	The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. In terms of the Energy 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.

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	» Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. 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 will look very different to 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. The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of Mutsho Solar PV3 supports the NDP through the development of energy-generating infrastructure which will not lead to the generation of GHGs and will result in economic development and growth of the area surrounding the development area.
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 which 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, 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 take into account 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.

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	» 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.
Integrated Resource Plan for Electricity (IRP) 2010-2030	The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation. 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 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 2021[9] with 5 078MW from 79 IPP projects operational and made available to the grid[10]. » 2 000MW of generating capacity (comprising various technologies) has been awarded to 8 Independent Power Producers under the RMIPPPP in March 2021. » 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 to. 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

9 Bid windows1, 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.

[10]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

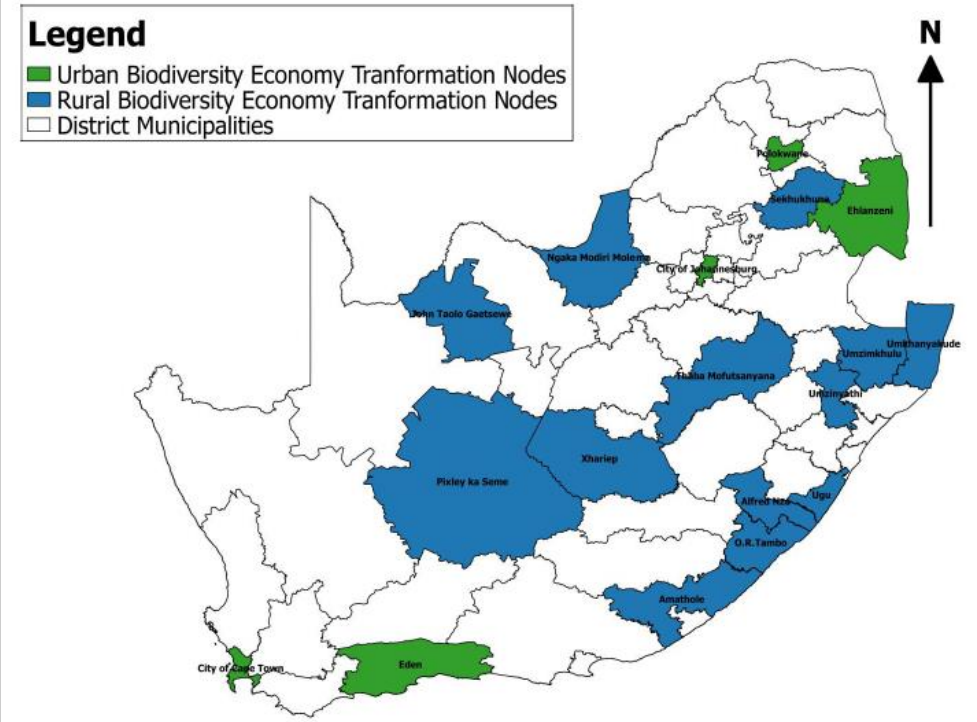
Relevant legislation or policy	Relevance to Mutsho Solar PV3
	Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible 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 year 2025 decline. Following consideration of all these factors, the following provision has been made for the following new capacity by 2030: » 1 500MW of coal; » 2 500MW of hydro; » 6 000MW of solar PV; » 14 400MW of wind; » 1 860MW of nuclear; » 2 088MW of storage; » 3 000MW of gas/diesel; and » 4 000MW from other distributed generation, co-generation, biomass and landfill technologies. Development of Mutsho Solar PV3 would contribute towards the allocation for solar PV energy development.
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, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas.
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 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. Mutsho Solar PV3 is a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
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

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	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 using 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 local government. The policy provides support for Mutsho Solar PV3, which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.
National Climate Change Response Strategy for South Africa, 2004	The need for a national climate change policy for South Africa was identified as an urgent requirement during the preparations for the ratification of the UNFCCC in 1997. A process to develop such a policy was thus instituted under the auspices of the National Committee for Climate Change (NCCC), a non-statutory stakeholder body set up in 1994 to advise the Minister on climate change issues and chaired by the then Department of Environmental Affairs and Tourism (DEAT). It was determined that a national climate change response strategy will promote integration between the programmes of the various government departments involved to maximise the benefits to the country as a whole, while minimising negative impacts. Further, as climate change response actions can potentially act as a significant factor in boosting sustainable economic and social development, a national strategy specifically designed to bring this about is clearly in the national interest, supporting the major objectives of the government, including poverty alleviation and the creation of jobs. A number of principles and factors guided the conception of the strategy and are required to be implemented. These are: » Ensuring that the strategy is consistent with national priorities, including poverty alleviation, access to basic amenities including infrastructure development, job creation, rural development, foreign investment, human resource development and improved health, leading to sustainable economic growth. » Ensuring alignment with the need to consistently use locally available resources. » Ensuring compliance with international obligations. » Recognizing that climate change is a cross cutting issue that demands integration across the work programmes of other departments and stakeholders, and across many sectors of industry, business, and the community. » Focussing on those areas that promote sustainable development. » Promoting programmes that will build capacity, raise awareness, and improve education in climate change issues. » Encouraging programmes that will harness existing national technological competencies. » Reviewing the strategy constantly in the light of national priorities and international trends.

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	» Recognizing that South Africa's emissions will continue to increase as development is realised. The strategy was devised through an integrated approach and considers policies and programmes of other government departments and the fact that South Africa is a developing country. This will ensure that the principles of sustainable development are adequately served and do not conflict with existing development policies.
Just Transition Framework for South Africa (June 2022) - A Presidential Climate Commission Report	The Presidential Climate Commission (PCC) is a multi-stakeholder body established by the President of the Republic of South Africa to (1) advise on the country's climate change response and (2) support a just transition to a low-carbon climate-resilient economy and society. The PCC facilitates dialogue between social partners on these issues—defining the type of economy and society the country wants to achieve, and detailed pathways for how to get there. One of the first tasks of the PCC was to design a just transition framework for South Africa. In December 2020, President Cyril Ramaphosa created the PCC to oversee and facilitate a just transition to a low-emissions and climate-resilient economy. The just transition framework is the first building block towards this objective, bringing coordination and coherence to just transition planning in the country. The just transition framework sets out a shared vision for the just transition, principles to guide the transition, and policies and governance arrangements to give effect to the transition. The Just Transition Framework builds on research, policies, and consultations on the just transition in South Africa, as well as international best practice guidelines. The Just Transition Framework sets out a shared vision for the just transition, principles to guide the transition, and policies and governance arrangements to give effect to the transition from an economy that is predominantly reliant on fossil-fuel based energy, towards a low-emissions and climate-resilient economy. The framework is a planning tool for achieving a just transition in South Africa, setting out the actions that the government and its social partners will take to achieve a just transition, and the outcomes to be realised in the short, medium, and long term.
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, strengthen the delivery of basic services, and support the integration of African economies. A balanced approach is being fostered through 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 supports 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 bio-fuel production facilities. » SIP 9: Electricity generation to support socio-economic development: The proposed Mutsho Solar PV3 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

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	if selected as a Preferred Bidder project by the Department Mineral Resources and 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. The Mutsho Solar PV3 could be registered as a SIP project once it is selected as a Preferred Bidder project and is under development. The project would then contribute to the above-mentioned SIPs.
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 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 a growing retail market demand for wildlife products such as game meat and taxidermy products. This sector is therefore characterised 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 %-14 % per year up to 2030. In order 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 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 a 14-year

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	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 to 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 a sector which is equitable - equitable access to resources, equitable and fair processes and procedures and equitable in distribution of resources (i.e. business, human, financial, indigenous species, land, water) in the market. To address these transformation NBES imperatives, NBES has the principles of: » Conservation of biodiversity and ecological infrastructure » Sustainable use of indigenous resources » Fair and equitable beneficiation » Socio-economic sustainability » Incentive driven compliance to regulation » Ethical practices » Improving quality and standards of products. The NBES provides the opportunity to redistribute South Africa's indigenous biological/ genetic resources in an equitable manner, across various income categories and settlement areas of the country. The NBES has prioritised nodes in the country for biodiversity economy transformation (BET), 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 development of small and medium size 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 identified as a priority area.

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	

5.5. Provincial Policy and Planning Context

A brief review of the most relevant provincial policies is provided below in **Table 5.3**. The proposed development is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 5.3: Relevant provincial legislation and policies for Mutsho Solar PV3

Relevant legislation or policy	Relevance to Mutsho Solar PV3
Limpopo Employment, Growth and Development Plan (LEGDP) 2009 - 2014	The Limpopo Employment, Growth and Development Plan provides a framework for the provincial government, municipalities, private sector and all organs of civil society to make hard choices in the pursuit of strategic priorities as encapsulated in the Medium-Term Strategic Framework (MTSF). The LEGDP provides a brief insight into the state of Limpopo's growth and development. The LEGDP states that "*the most pressing problem facing Limpopo Province today is the absence of sustained economic growth and job creation, which are essential to reduce poverty and improve living conditions*". The industrial development emphasis to be pursued by the province is therefore to move onto an industrialization trajectory that is responsive to: » Intensification of Limpopo's industrialisation process and movement towards a knowledge economy. » Provision by domestic manufacturers of the capital goods that the growing economy needs and will continue to demand.

Relevant legislation or policy	Relevance to Mutsho Solar PV3
	» Promotion of more labour-absorbing industrial sectors, with an emphasis on tradable labour-absorbing goods and services and economic linkages that catalyse employment creation. » Promotion of a broader based industrialisation path that is characterized by greater levels of participation of historically disadvantaged people, and marginalized regions in the mainstream of the industrial economy. Ensuring more inclusive economic growth, decent work and sustainable livelihoods has been identified as a priority. The main objective with regard to the priority is to respond appropriately, promptly and effectively so that growth in decent employment and improvements in income security are reinforced, and investment sustained to build up provincial economic capability and improve industrial competitiveness. This has to be conducted in an environment of a stable macro-economy which provides conditions for higher rates of investment and creation of decent jobs. Growth of the green economy in the Limpopo Province and the creation of green jobs is listed as one of the actions that the government intends to take to accelerate growth and development in the Province and address some of the key challenges expected to affect the Province over the next decade. The development of Mutsho Solar PV3 will contribute towards the creation of green jobs, and growth of the Province's green economy, leading to a reduction in poverty and an increase in the standard of living.
Limpopo Development Plan (LDP) 2015 -2019	The Limpopo Development Plan (LDP) 2015 – 2019 builds on the foundations of the Limpopo Economic Growth and Development Plan (LEGDP) 2009 – 2014 and the Limpopo Provincial Growth and Development Strategy (PGDS) 2004 – 2008. The purpose of the LDP 2015 – 2019 is to: » Outline the contribution from Limpopo Province to the National Development Plan (NDP) objectives and the national MTSF (Medium-Term Strategic Framework) for this period. » Provide a framework for the strategic plans of each provincial government department, as well as the Integrated Development Plans (IDPs) and sector plans of district and local municipalities. » Create a structure for the constructive participation of private sector business and organised labour towards the achievement of provincial growth and development objectives » Encourage citizens to become active in promoting higher standards of living within their communities. The development strategy, as outlined in the LDP, is designed on the floor plan of fourteen (14) development outcomes contained in the MTSF for 2015 – 2019. Of relevance to Mutsho Solar PV3 are outcome 4: decent employment through inclusive growth; outcome 6: competitive economic infrastructure; and outcome 10: environmental protection.

5.6. Local Policy and Planning Context

The local tiers of government relevant to Mutsho Solar PV3 are the Musina Local Municipality and the Vhembe District Municipality. Instruments and/or policies at both the district and local level contain

objectives which align with the development of Mutsho Solar PV3. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 5.4: Relevant district and local legislation and policies for Mutsho Solar PV3

Relevant policy	Relevance to Mutsho Solar PV3
Vhembe District Municipality Integrated Development Plan (IDP) (2021/2022)	The vision of the Vhembe District Municipality is as follows: "A developmental municipality focusing on sustainable service delivery and socio-economic development towards an equal society." The Mission of the Municipality is: "To be an accountable and community driven municipality in addressing poverty and unemployment through sustainable socio-economic development and service delivery." Service delivery and infrastructure development are a priority area for the Vhembe District Municipality. The strategic objective aligned to this priority area is to improve access to services through the provision, operation, and maintenance of socio-economic and environmental infrastructure. * According to the IDP, load shedding is one of the challenges experienced within the Vhembe District Municipality. The development of Mutsho Solar PV3 will lead to an increased energy security and assist Eskom in alleviating the need for rolling black-outs when aging power stations have been offline for maintenance.
Musina Local Municipality Integrated Development Plan (IDP) (2021/2022)	The vision of the Musina Local Municipality is: "To be the vibrant, viable and sustainable gateway city to the rest of Africa." The Municipality's mission is as follows: "Vehicle of affordable quality services and stability through socio-economic development and collective leadership". » A number of strategic objectives have been included in the IDP. Of relevance to Mutsho Solar PV3 is the municipality's objective to initiate and improve the quantity and quality of municipal infrastructure services. One of the municipality's focus areas in this regard is the upgrade of electricity capacity to ensure consistent and reliable power supply. The development of Mutsho Solar PV3 will lead to increased energy security in the Musina Local Municipality.

5.7. Conclusion

From a review of the relevant policy and planning framework, it can be 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.

CHAPTER 6: NEED AND DESIRABILITY

Appendix 3 of the 2014 EIA Regulations (GNR 326) requires that an EIA Report includes a motivation for the need and desirability of the proposed development, including the need and desirability of the activity in the context of the preferred location. The need and desirability of the development needs to consider whether it is the right time and the right place for locating the type of land-use/activity being proposed. The need and desirability of a proposed development is, therefore, associated with the wise use of land, and should be able to respond to questions such as, but not limited to, what the most sustainable use of the land may be.

This Chapter provides an overview of the need and desirability, and perceived benefits of the project specifically.

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

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

Requirement	Relevant Section
3(1)(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report.	The need and desirability for the development of Mutsho Solar PV3 is included and discussed as a whole within this chapter. The need and desirability for the development of the Solar PV Facility has been considered from an international, national, regional and site-specific perspective.

6.2. Need and Desirability from an Energy Perspective

Electricity is essential for most human activities and for South Africa's social and economic development. The development of large-scale electricity generation projects contributes towards security of supply and assists in minimising the costs of energy. In order for the benefits associated with electricity to be realised, it needs to be readily available, easily accessible, and affordable. It should also be generated in a sustainable manner, while minimising adverse social and environmental impacts. In addition to energy provision, large-scale electricity generation projects, such as Solar PV Facilities, have the ability to contribute positively to the creation of skilled, unskilled, and semi-skilled employment opportunities and mitigate climate change.

An increased supply of electricity within or to an area is also considered beneficial from a development perspective as the availability of electricity and other services can act as a pull factor attracting new development and industry.

6.3. Need and Desirability from an International Perspective

The need and desirability of Mutsho Solar PV3, from an international perspective, can be described through the project's alignment with internationally recognised and adopted agreements, protocols and conventions. South Africa is a signatory to a number of international treaties and initiatives, including the

United Nation's Development Programme's (UNDP's) Sustainable Development Goals (SDGs). The SDGs address global socio-economic challenges such as poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanisation, environment and social justice. The SDGs consist of 17 global goals set by the United Nations. The 17 SDGs are characterised by 169 targets, and 304 indicators.

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

Targets		Indicators	
7.1	By 2030, ensure universal access to affordable, reliable and modern energy services.	7.1.1 7.1.2	Proportion of population with access to electricity. 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	Mobilised amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment.
7.B	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.	7.B.1	Investments in energy efficiency as a percentage of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services.

The development of Mutsho Solar PV would contribute positively towards Goal 7 of the SDGs through the following:

- By generating up to 100MW (contracted capacity) of affordable and clean energy.
  - A study published by the CSIR on 14 October 2016 ("Cost of new power generators in South Africa Comparative analysis based on recent Independent Power Producer (IPP) announcements", Dr Tobias Bischof-Niemz and Ruan Fourie) which took into consideration the results of the cost prices bid successfully under the Department of Mineral Resources and Energy's Renewable Energy (RE) IPP and Coal Baseload IPP Procurement Programmes, found that solar PV and wind were 40% cheaper than new baseload coal (i.e. R0.62/kWh for PV and wind vs R1.03 for coal).
  - Solar power technology is one of the cleanest electricity generation technologies, as it does not result in the release of emissions during its operation.
- By contributing towards South Africa's total generation capacity, specifically through the utilisation of renewable energy resources.

The Kyoto Protocol (1997) is also relevant to the need for the development of Mutsho Solar PV3 from an international perspective. The protocol calls for the reduction of South Africa's greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. The development of Mutsho Solar PV3 will add capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements, as set out in the protocol, through the generation of energy without the emission of greenhouse gasses.

6.4. Need and Desirability from a National Perspective

South Africa has experienced 15 years of intermittent black-outs and in the recent months, the country has yet again faced a considerable shortage in the availability and stability of electricity supply. Following the energy crisis in 2008, South African Government started to introduce renewable energy developments on a large scale and further enhanced the promotion of energy efficiency in all sectors to meet the demand of energy while reducing CO_2 emissions and creating jobs[11]. As a consequence, significant investment in renewable energy and energy efficient is required. Increasing the diversity of South Africa's electricity mix is important, not only for enhancing the crucially important security of supply of the country, but also to support job creation and mitigate climate change.

The National Development Plan (NDP) envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates; that is socially equitable through expanded access to energy at affordable tariffs; and that is environmentally sustainable through reduced emissions and pollution. Historically, coal has provided the primary fuel resource for baseload electricity generation in South Africa. Consequently, Eskom, who is the main electricity generating company in the country, generates approximately 85% of the country's electricity from coal resources (Stats SA, 2016), resulting in a large carbon footprint. Taking into consideration the need to ensure adequate supply of electricity and meet international obligations in terms of addressing climate change, Government has identified the need to diversify the energy mix within the country.

South Africa needs to build about 40 000MW of new generation capacity to meet demand requirements. According to the NDP, 17800MW should be provided by renewable energy projects. To achieve this, the government plans to install a total of 8 400 MW of wind energy, 8 400MW of solar photovoltaic energy, and 1 000 MW of concentrated solar power by 2030.

Mutsho Solar PV3 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 Mutsho Solar PV3 from a national perspective can largely be linked from the project's alignment with national government policies, plans, and programmes which have relevance to energy planning and production (as discussed in detail in **Chapter 5**). The following key plans have been developed by National Government to consider South Africa's current energy production, projected future demands, and provides the necessary framework within which energy generation projects can be developed:

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

[11] https://energypedia.info/wiki/South_Africa_Energy_Situation

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

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

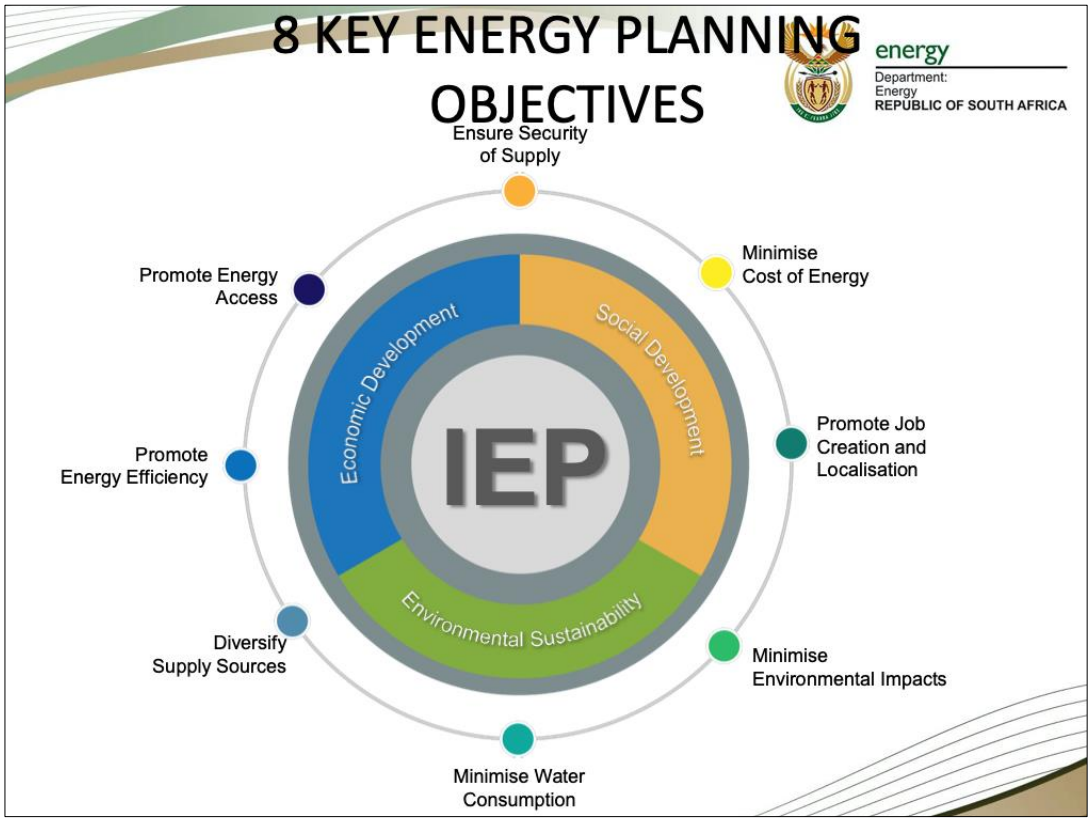


Figure 6.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

The latest iteration of the IEP (25 November 2016) contains 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 Northern Cape, which is one of the best solar resource areas in the world. With electricity production per square kilometre of mirror surface in a solar thermal power station being 30.2MW, 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 which reduces reliance on a single or a few primary energy sources, and includes the following statement regarding solar energy's contribution to the diversified energy mix:

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

The IRP for Electricity 2010 – 2030 (gazetted in 2019) 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. This plan provides for the development of 8 288MW of capacity from Solar Photovoltaic energy facilities by 2030, with an annual contribution of 1000MW from 2022.

Provision has been made for new additional capacities in the IRP 2019 (refer to **Table 6.1**).

Table 6.1: Overview of the total installed capacity expected by 2030

IPP Procurement Programme	Technology	MW	Total
Renewables	Wind	17 742MW	31 320MW
	Solar CSP	6000MW	
	Solar Photovoltaic	8 288MW	
	Hydro	4 600MW	
Coal	Coal	33 364MW	33 364MW
Nuclear	Nuclear	1 860MW	1 860MW
Gas & Diesel	Gas & Diesel	3 000MW	3 000MW
Other (Distributed Generation, CoGen, Biomass, Landfill)	Other (Distributed Generation, CoGen, Biomass, Landfill)	4 000MW	4 000MW

Renewable resources are valuable in contributing towards electricity generation and diversifying South Africa's electricity mix, while contributing towards South Africa's response to Climate Change. A number of IPP Procurement Programmes have been initiated by government to secure electricity generated from a range of resources from the private sector (i.e., from Independent Power Producers, or IPPs). Under these

Programmes, IPPs are invited to submit proposals for the finance, construction, operation, and maintenance of electricity generation facilities for the purpose of entering into an Implementation Agreement with the DMRE and a Power Purchase Agreement (PPA) with Eskom as the buyer.

Between 2011 and 2021, the South African Government, through its IRP 2010 -2020, have successfully launched and completed five bidding windows under the REIPPPP[12] (refer to Table **Figure 6.2**[13]).

REIPPPP Bid Windows	1	2	3	3.5	4	4 (additional)	4.5 (expedited)	5	[...13] (up to 2030)	Total
Bid Date	04-Nov-11	05-Mar-12	19-Aug-13	03-Mar-14	17-Aug-14	17-Aug-14	11-Nov-15	16-Aug-21	TBD	-
Pref. Bidders ("PB") announced	07-Dec-11	21-May-12	31-Dec-13	14-Dec-14	16-Apr-15	07-Jun-15		TBD	TBD	-
Financial Close ("FC") - from	19-Jun-12	13-Dec-12	30-Jul-14	01-May-21	30-Apr-18	30-Apr-18		TBD	TBD	-
Years betwen PB annoucement & FC	0.54	0.57	0.58	6.39	3.05	2.90		TBD	TBD	-
Projects Bid	53	79	93	3	74	-	CANCELLED	102	TBD	**404.0**
Projects awarded	28	19	17	2	13	13		TBD	TBD	**92.0**
Capacity offered (MW)	3,625	1,275	1,473	300	1,105	1,170		2,600	[29,000*]	**11,548.0**
Capacity awarded (MW)	1,426	1,040	1,457	200	1,121	1,084		TBD	TBD	**6,327.9**
Total investment ($bn)	6.2	4.2	4.5	1.8	2.0	1.9		TBD	TBD	**20.5**
Avg. Real IRR (ZAR)	17.0%	15.5%	11.0%	13.75%	9.5%	9.5%		[3%-7%*]	TBD	-

*Estimation; TBD – To be Determined

Source: Finergreen

Figure 6.2: Overview of bid windows 1 to 5

Figure 6.2 shows that between 2011 and 2015 (excluding bid window 5), 302 bids were submitted, with around 30% (92) of the projects receiving approval. From those 92 projects, close to 70% (4.41GW) are already in operation, with wind and solar PV projects compromising most of the projects awarded (roughly 86%). In addition, of the 11.5GW of total capacity offered, 6.3GW (roughly 71%) was allocated, with wind and solar PV projects comprising the majority of projects.

Preferred bidders identified under any IPP Procurement Programme, including the REIPPPP, are required to satisfy a number of economic development requirements, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-economic development. In addition to electricity generation and supply, IPP Procurement Programmes also contribute positively towards the socio-economic development of a region, over and above job creation.

In addition to government procurement programmes, various private procurement initiatives have been undertaken by various industries that are electricity intensive which have identified a need to diversify their energy mix and to change their reliance on State-provided electricity. In 2021, the South African government acknowledged that aging state-owned electricity infrastructure and a demand far surpassing supply, is hampering the country and economy's growth. On 10 June 2021, President Ramaphosa announced the government's approval of an increase in the generation license exemption threshold for embedded generation facilities from 1MW to 100MW. This allows industry to not only generate electricity for self-consumption but allows them to develop facilities with a more realistic capacity response to their demand requirements without the need to obtain a Generation License from NERSA. This in turn aims to reduce generation demands on the national grid and to alleviate residential, commercial, and industrial electricity supply constraints.

[12]https://www.pv-magazine.com/2021/09/30/reippp-one-of-the-worlds-best-renewable-energy-tenders-but-theres-room-for-improvement/

[13] 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021. 860MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 5 in December 2022.

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.

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 6.3**).
2. Enabling conditions for growth: these are growth-enhancing reforms and other preconditions for an inclusive, competitive and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery requires careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution, and is supported by enhanced institutional arrangements to ensure implementation and accountability.

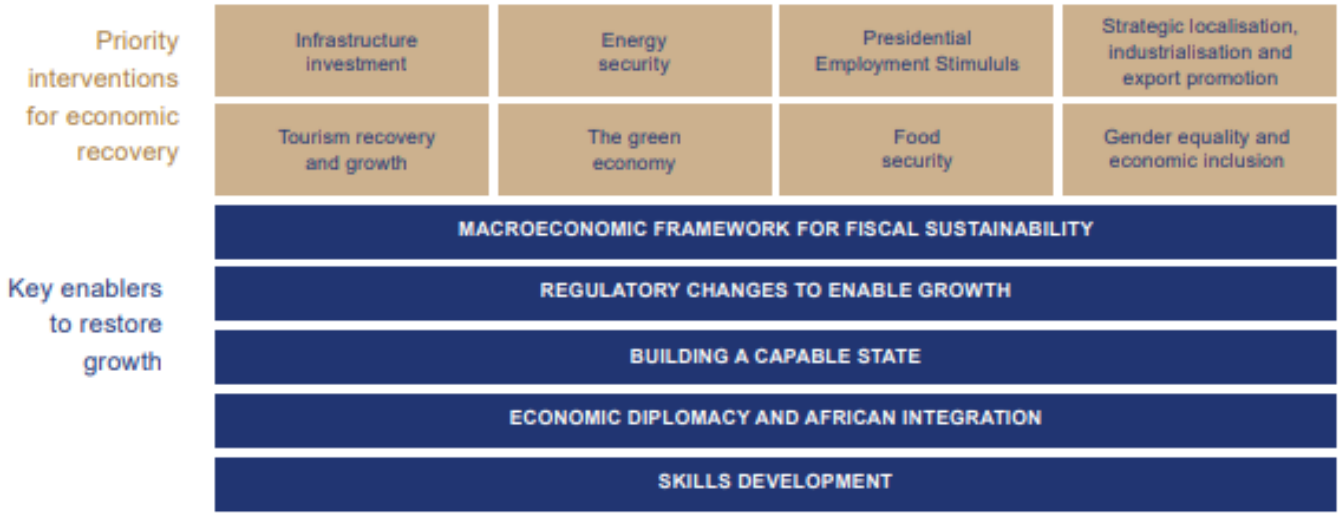


Figure 6.3: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

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 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 jobs 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). Even though the project will not form part of the REIPPP programme, the Applicant will implement similar 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.

The need for new power generation from solar PV facilities has been identified and assessed by government at a national scale, considering the national energy requirements as well as international commitments under the Paris Agreement; therefore, provision has been made for the inclusion of new PV power generation capacity in South Africa's energy mix. The implementation of Mutsho Solar PV3 has the potential to contribute positively towards the identified need, while simultaneously contributing to job creation and socio-economic development, identified as a need for the country within the National Development Plan (NDP).

Mutsho Solar PV3 will make use of solar PV technology and will 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, Mutsho Solar PV3 will have reduced water requirements when compared with some other generation technologies in alignment with one of the vision 2030 themes of the then-Department of Water and Sanitation's National Water Resource Strategy 2 (2013) (i.e., transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

6.4.1. Benefits of Renewable Energy and the Need and Desirability 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:

Socio-economic upliftment of local communities: Mutsho Solar PV3 has the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. In terms of the needs of the local community, the Local and District municipality IDPs identified the need to facilitate economic development by creating an environment that is conducive for business development, economic growth, sustainable employment opportunities and growth in personal income levels of communities; unlock opportunities to increase participation amongst all sectors of society in the mainstream economy to create decent job opportunities; promote Local Economic Development; and enhance rural development and agriculture.

Since inception of the REIPPPP in 2011 up to bid window 4, approximately 109 400 job years for South African citizens to date have been created[14]. Mutsho Solar PV3also has the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPPP, the project will commit benefits to the local community in the form of job creation, localisation, and community ownership. In accordance with the DMRE's bidding requirements of the REIPPPP, a percentage of the revenue generated per annum during operation will be made available to local communities through a social beneficiation scheme. Therefore, the potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment.

Increased energy security: Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. According to CSIR's power sector statistics[15], South Africa experienced loadshedding for 1 169 hours in 2021 (~13% of the time) wherein 2 521GWh of estimated energy was shed (mostly stage 2 load shedding). This is a 40% increase on the total loadshedding experienced during 2020. It is important to note that although extensive load shedding continued during 2021, record relative variable renewable energy contributions were recorded, with solar PV contributing 5.1 TWh.

Resource saving: It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability. Renewable energy also translates into revenue savings, as fuel for renewable energy facilities is free, while compared to the continual purchase of fuel for conventional power stations.

According to the IPP Procurement Programme overview report dated 31 March 2021, water savings of 71.7 million kilolitres has been realised by the programme from inception to the date of this publication, of which 4.2 million kilolitres is in the 2021 reporting quarter included in this report.

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

According to the IPP Procurement Programme overview report, as of 31 March 2021, the REIPPPP had made the following significant impacts in terms of energy supply:

» 6 422MW of electricity had been procured from 112 Renewable Energy Independent Power Producers (IPPs) in seven bid rounds[16].

[14] University of Cape Town. The South African Renewable Energy IPP Procurement Programme: Review, Lessons Learned & Proposals to Reduce Transaction Costs.

[15] CSIR Energy Centre. Statistics of utility-scale power generation in South Africa in 2021. April 2022

[16] Bid windows1, 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. 860MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 5 in December 2022.

- 5 078 MW of electricity generation capacity from 79 IPP projects has been connected to the national grid.
- 59 761GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational in November 2013. Renewable energy IPPs have proved to be very reliable. Of the 79 projects that have started operations, 67 projects have been operational for longer than a year. The electrical energy generated over the past 12-month period for the 67 projects is 11 679GWh, which is 94% of their annual energy contribution projections of 12 481GWh over a 12-month delivery period. Twenty-six (26) of the 67 projects (39%) have individually exceeded their projections.

In August 2021, Bid Window 5, which had aimed to sign up 2 600MW of power, including 1 600MW of wind and 1 000MW of solar was open. It attracted 102 bids, offering capacity of 9 644MW. 25 Preferred Bidders were selected to provide a total of 2 583MW from wind and solar developments.

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 2021) in terms of investment and economics:

- Investment (equity and debt) to the value of R209.7 billion was attracted in seven bid rounds.
- Socio-economic development contributions of R1.5 billion to date, of which R103.5 million was spent in this 2021 reporting quarter.
- Enterprise development contributions of R463.5 million to date, of which R34.8 million was spent in this 2021 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 irradiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.

The overview of the Independent Power Producers Procurement Report (March 2021) indicates that a carbon emission reduction of 60.7 Mton CO_2 has been realised by the IPP programme from inception to date, of which 3.6 Mton is in the 2021 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 GHG emissions. South Africa is estimated to currently be responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is ranked 12th worldwide in terms of per capita carbon dioxide emissions as of 2021. Since its inception, the REIPPPP has achieved carbon emission reductions carbon emission reduction of 60.7 Mton CO_2. The development of Mutsho Solar PV3, and the associated electricity generated as a result of the facility, will result in considerable savings on tons of CO_2 emissions.

Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under 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.

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

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

Protecting the natural foundations of life for future generations: Actions to reduce our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change, thereby securing the natural foundations of life for generations to come; this is the basis of sustainable development.

6.5. Need and Desirability of the project from a Regional Perspective

Limpopo's Public Infrastructure Investment Programme identified in the Limpopo Employment, Growth, and Development Plan (LEGDP) 2009 – 2014 indicates that the government has a pressing need to accelerate sustainable socio-economic development by, amongst other things, rolling out on a mass scale physical, social and economic infrastructure.

The core aspects of the socio-economic infrastructure are:

- Bulk infrastructure [Sewer, Water and Sanitation, Electricity, and Communication]
- Social Infrastructure such as housing, school and hospitals
- Economic Infrastructure such as freight and logistics

With regards to social infrastructure, housing, electrification, and water utilities take priority due to immense mining and energy investments that have flown into the province. This results in pressing demand for infrastructure development especially in areas where these developments are taking place. It is also crucial to note that shortages of water and electricity in some rural pockets of the province have reached alarming levels.

The Limpopo Development Plan 2015 -2019 provides a framework for the strategic plans of each provincial government department. The LDP makes a case for the investment in a strong network of economic infrastructure designed to support economic and social objectives. This, it is stated, is a precondition for providing basic services such as electricity, among others. To achieve this, basic services must be robust and extensive enough to meet industrial, commercial, and household needs.

The Limpopo Provincial Government views economic infrastructure as a base for economic and social upliftment. As a means to achieve this, the provincial government sought to attract investment in coal and

energy. Furthermore, to expand business activities in the province, the coal and energy SMME growth initiative is promoted. The energy sector therefore has the power to contribute to and maintain the growth of the provincial economy.

The development of Mutsho Solar PV3 would contribute positively towards increased electricity provision which could be used in the development of socio-economic infrastructure within the province, as well as to increase employment opportunities.

6.6. Need and Desirability of the project from a District and Local Perspective

In terms of energy supply and demand management, the energy needs to poor households are still immense (Vhembe District Municipality Integrated Development Plan (IDP), 2021/2022). The original goal of universal electricity by 2014 was not feasible and hence a need to review the target and planning (National Development Plan, 2011).

There are currently eleven (11) substations servicing the Vhembe District Municipality. Challenges that hinder proper energy supply in the district include cable theft, illegal connections, tempering and bridging of meters, and transformer theft, amongst others.

With regard to the employment status, Vhembe District Municipality had a labour force participation of 44.2% in 2018, this increased from 36.8% in 2008 (Vhembe District Municipality Integrated Development Plan (IDP), 2021/2022). Vhembe District Municipality had an unemployment rate of 16.1% in 2018, which decreased from 27.7% in 2008.

According to the Integrated Development Plan (IDP) 2021/2022, Musina Local Municipality had an unemployment rate of 7.95% in 2018, which decreased from 16.4% in 2008. The Municipality's Local Economic Development (LED) Strategy depicts that, the LM's economic growth potential is in Agriculture, Tourism and Mining.

The main contributors to Musina Local Municipality's economy are agriculture, forestry and fishing, mining, transport and communication, manufacturing, finance and business services, wholesale and retail trade, catering and accommodation, community, social, personal services, government services, and construction.

The Musina Local Municipality has a dualistic economy comprising a "commercial" component located in Musina (urban area) and "non-commercial" component. Development constraints encountered in respect of the "non-commercial component" within which Mutsho Solar PV3 is proposed are defined as follows:

- The natural resource base and economy does not have the capacity to support the total population, forcing a large percentage of the labour force to seek employment opportunities outside of the municipality.
- The low levels of income from the formal sector forced a portion of the population still residing in the area to enter and participate in informal and marginal activities.
- The low level of income also imply low levels of buying power and , therefore, few opportunities for related activities such as trade. This in turn supports the leakage of buying power since there are fewer local outlets to buy from.

- Land claims are a major factor influencing development. A total of approximately 781 920ha (representing 30.53% of the total area of the Vhembe district) is subject to land claims. The total area of the municipality is 757 829ha and the amount of land claimed is approximately 279 109ha, which comprises more than a third (36%) of the municipality.
- The economic relationship between the settlements in the municipality and Musina CBD are not yet strong.
- Employment opportunities in Musina should also benefit people from the other settlements.
- There is a shortage of job opportunities and job creation in the area.
- Established businesses and farmers still prefer to employ immigrants at lower wages.
- SMME's need financial assistance to expand their businesses and to promote/advertise their products.
- There is a lack of finance to pursue farming projects.
- Land availability for SMME's.

The Musina Local Municipality's development opportunities can be summarised as follows:

- Agricultural activities take up large portions of land in the municipality, with more than half of the employed population being employed in this sector. The agricultural sector of Musina municipality also contributes approximately 35% to the same sector in the district, confirming its importance to the local economy. It is however essential that job opportunities are spread to also include people from the settlements in the eastern parts of the municipality, which are very rural in nature and not reaping the same benefits as the population in the urban area surrounding Musina town.
- The manufacturing sector of the economy is not currently performing well. However, given the strong Agricultural base, opportunities for expansion of the manufacturing industry exists through agro-processing and other activities.
- The municipality benefits from a potentially economically active population that comprises approximately 70% of the total population, which provides the municipality with a large human resource base.
- This allows opportunities for development projects to involve and benefit local people. The age distribution of the municipality's population also indicates a fairly young potential economically active population, necessitating development to focus on the youth.
- In terms of economic indicators, the municipality also enjoys comparative advantages in the Agriculture, Mining, Manufacturing and Transport industries, compared to the District.
- The municipality should therefore capitalize on these advantages to further strengthen its position in the district. Furthermore, the fastest growing sectors in the municipality were those of Transport and Construction sectors. The current growth occurring in these sectors should be exploited to ensure the creation of new job opportunities for the local people.

The development of Mutsho Solar PV3 could be expected to contribute positively towards both increased electricity supply and new employment opportunities which would benefit both the Musina Local Municipality and greater Vhembe District.

6.7. Receptiveness of the project site to the development of Mutsho Solar PV3

The overarching objective of Mutsho Solar PV3 is to maximise electricity production utilising the solar resource. The placement of a Solar PV Facility is strongly dependent on several factors, including climatic conditions (solar irradiation levels), topography, the location of the site, and in particular the location in a node for renewable projects, availability of grid connection, the extent of the site and the need and

desirability for the project as detailed in this Chapter. From a regional site selection perspective, the Limpopo region is considered to be favourable for the development of a Solar PV Facility as it is ranked fourth amongst South Africa's provinces in terms of its estimated solar power generation potential. From a local level perspective, the project site has specifically been identified by the proponent as being highly desirable for the development of a Solar PV Facility based on the characteristics detailed in Chapter 3.

6.8. Conclusion

From the detail presented in this chapter, 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 resource. 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 the EIA 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 associated with the project are identified and described within this EIA Report.

CHAPTER 7: APPROACH TO UNDERTAKING THE EIA PROCESS

In terms of the EIA Regulations of December 2014 published in terms of the NEMA (Act No. 107 of 1998), as amended, the construction and operation of Mutsho Solar PV3 is a listed activity requiring Environmental Authorisation (EA). The application for EA is required to be supported by a Scoping & Environmental Impact Assessment (EIA) process based on the contracted capacity of the facility being 100MW which triggers Activity 1 of Listing Notice 2 (GNR 325).

An EIA process refers to the process undertaken in accordance with the requirements of the 2014 EIA Regulations (GNR 326), as amended, which involves the identification and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project or activity. The EIA process comprises two main phases: i.e., **Scoping** and **EIA Phase**, and is illustrated in **Figure 7.1**. Public participation forms an important component of the process and is undertaken throughout both phases.

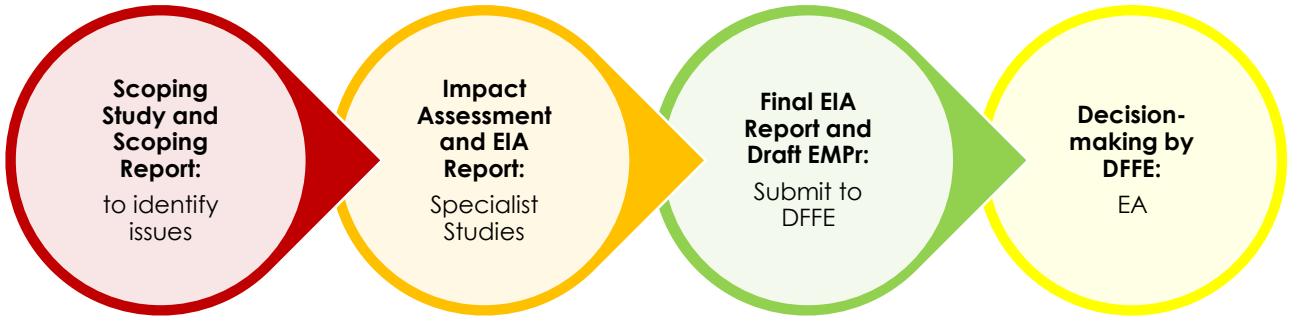


Figure 7.1: The Phases of an Environmental Impact Assessment (EIA) Process

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

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

Requirement	Relevant Section
3(1)(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and (ii) a description of the associated structures and infrastructure related to the development.	All listed activities triggered and applied for are included in **Section 7.2** and **Table 7.1**.
3(1)(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The public participation process followed throughout the EIA process of Mutsho Solar PV3 is included in **Section 7.5.2** and copies of the supporting documents and inputs are included in **Appendix C**.

Requirement	Relevant Section
3(1)(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.	The main issues raised through the undertaking of the public participation process, including consultation with I&APs, are included in the Comments and Responses Report in **Appendix C8**.
3(1)(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives are included in **Section 7.6.3**.
3(1)(p) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the S&EIA process being undertaken for Mutsho Solar PV3 is included in **Section 7.6**.

7.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to Mutsho Solar PV3 as identified at this stage in the process and considered within this EIA process, are described in more detail under the respective sub-headings. Additional permitting requirements applicable to the project are detailed within **Section 7.8**.

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

The 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 the NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed, and reported on to the Competent Authority (the decision-maker) charged by NEMA with granting of the relevant Environmental Authorisation (EA). Since the Mutsho Solar PV3 is a power generation project and therefore relates to the IRP for Electricity 2010 – 2030, the National Department of Forestry, Fisheries, and the Environment (DFFE) has been determined as the Competent Authority (CA) in terms of GNR 779 of 01 July 2016. The Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDL&EA) is the Commenting Authority on the project.

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

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

Table 7.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) that apply to Mutsho Solar PV3, and for which an application for EA has been submitted to the DFFE. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 7.1: Listed activities identified in terms of the Listing Notices (GNR 327, 325 and 324).

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	11(i)	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV. ***Electrical infrastructure required to connect the PV facility to the national grid will consist of a 33/132kV onsite substation (IPP Portion). The site is located outside an urban area.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	12(ii)(a)(c)	The development of – (ii) Infrastructure or structures with a physical footprint of 100 square metres or more Where such development occurs- (a) within a watercourse; or (c) within 32 metres of a watercourse. ***The project site is characterised by watercourses. The proposed development will therefore require the establishment of infrastructure within a physical footprint exceeding 100 square metres within a watercourse or within 32 metres of a watercourse identified within the project site.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	14	The development and related operation of facilities and infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. ***The development of the project 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 onsite substation where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	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 (i) Watercourse. ***The project site is characterised by watercourses and therefore, the development will require the removal of approximately 10 cubic metres of soil and rock from the watercourses during the construction phase.***
Listing Notice 1 (GNR 327)	28(ii)	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:

Notice Number	Activity Number	Description of listed activity
08 December 2014 (as amended on 07 April 2017)		(ii) will occur outside an urban area, where the total land to be developed is bigger than 1ha. ***The total area to be developed for Mutsho Solar PV3 is greater than 1ha and occurs outside an urban area in an area currently zoned for agriculture.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more. ***The project comprises a renewable energy generation facility, which will utilise solar power technology and will have a generating capacity of up to 100MW.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	15	The clearance of an area of 20ha or more of indigenous vegetation. ***The facility is located on agricultural land and is therefore likely to comprise indigenous vegetation. The project would therefore result in the clearance of indigenous vegetation within an area in excess of 20ha for the development infrastructure.***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	4(e)(i)(dd)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **e. Limpopo** i. Outside urban areas: (dd) Sites or areas identified in terms of an international convention. ***Internal gravel roads of up to 5km in length and 4.5m in width will be required to access the PV panels and the onsite substation. The site falls within the Limpopo Province, outside urban areas, and within the Vhembe Biosphere Reserve, which is classified as a United Nations Educational, Scientific and Cultural Organization (UNESCO) site.***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	10(e)(i)	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. **e. Limpopo** i. All areas. ***The development of the facility will require the storage and handling of a dangerous good with a capacity of 80 cubic meters. The site is located within the Limpopo Province.***
Listing Notice 3 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	14(ii)(a)(c)(e)(i)(ee)(ff)	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—

Notice Number	Activity Number	Description of listed activity
		(a) within a watercourse; or (c) within 32 metres of a watercourse, measured from the edge of a watercourse. **e. Limpopo** i. Outside urban areas: (ee) Sites of areas identified in terms of an international convention. (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The project site is characterised by watercourses. The proposed development will therefore require the establishment of infrastructure with a physical footprint exceeding 100 square metres within a watercourse or within 32 metres of a watercourse identified within the project site. The site falls within the Limpopo Province, outside urban areas, and within the Vhembe Biosphere Reserve, which is classified as a United Nations Educational, Scientific and Cultural Organization (UNESCO) site. The site also overlaps with an Ecological Support Area (ESA2).***

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

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

In terms of the 2018 National Biodiversity Assessment (NBA), the project site is 11km away from the closest NBA river and 7.6km away from the closest wetland. Based on the National Freshwater Ecosystem Priority Areas (NFEPA), 2015, a non-priority seepage system is located within the extent of the project area. The wetland is considered to be in a seriously modified ecological state.

Table 7.2 contains Water Uses associated with the proposed project and identified in terms of the NWA which require licensing either in the form of a General Authorisation (GA), or in the form of a Water Use License (WUL). The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 7.2: List of Water Uses published under Section 21 of NWA, as amended.

Notice No.	Activity No.	Description of Water Use
NWA (No. 36 of 1998)	Section 21 (a)	Taking water from a water resource. ***Groundwater from existing boreholes will be abstracted for use during the construction and operation phases for the project.***

Notice No.	Activity No.	Description of Water Use
NWA (No. 36 of 1998)	Section 21 (c)	Impeding or diverting the flow of water in a watercourse ***The project site is characterised by watercourses. Activities pertaining to the establishment of the infrastructure might encroach on the wetlands which may lead to an impediment and diversion of the flow of water in the watercourse.***
NWA (No. 36 of 1998)	Section 21 (g)	Disposing of waste in a manner which may detrimentally impact on a water resource. ***The sewage generated during the operation phase will be stored in a conservancy or septic tank which will be regularly pumped out by a dedicated service provider. This activity requires a license (GA if volumes are below 10 000m³) in terms of the NWA.***
NWA (No. 36 of 1998)	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***The project site is characterised by watercourses. Activities pertaining to the establishment of the infrastructure might alter the bed, banks, course or characteristics of the watercourses.***

In the event that the flow of water in the freshwater/drainage features is affected and the bed, banks or course characteristics are altered, then a water use authorisation would be required. This will need to be in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GNR 267), or a GA registered in accordance with the requirements of the Revision of General Authorisation. The process of applying for a WUL or GA registration will only be completed once a positive EA has been received and the project selected as Preferred Bidder under the REIPPPP or similar programme. This is in line with the requirements of the Department of Water and Sanitation (DWS).

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

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

Section 38: Heritage Resources Management

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

- *a. the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- *b. the construction of a bridge or similar structure exceeding 50m in length;*
- *c. any development or other activity which will change the character of a site –*
  - *i). exceeding 5 000m² in extent; or*
  - *ii). involving three or more existing erven or subdivisions thereof; or*

iii). involving three or more erven or divisions thereof which have been consolidated within the past five years; or

iv). the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority.

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

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

7.3 Overview of the Scoping Phase

The final Scoping Report was submitted to the DFFE on **6 September 2022** and subsequently accepted on **21 October 2022** documented the evaluation of potential environmental impacts associated with Mutsho Solar PV3. The Scoping Phase was conducted in accordance with the requirements of the 2014 EIA Regulations (GNR 326), as amended, and therefore aimed to:

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

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

- Identify the policies and legislation relevant to the project.
- Motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred project location.
- Identify and confirm feasible alternatives for the project.
- Identify and describe potential impacts associated with the undertaking of the identified activities and proposed technology.
- Identify areas of high sensitivity to be avoided by the project infrastructure.
- Identify and list key issues associated with the project to be addressed during the EIA Phase through further detailed study and ground-truthing.

- Agree on the level of assessment, including the methodology to be applied, the expertise required, and the extent of further consultation to be undertaken in the EIA Phase of the process, with the aim of determining the extent of impacts associated with the activities through the life cycle of the project (i.e., construction, operation, and decommissioning).
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Key tasks undertaken within the Scoping Phase include:

- Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- Submission of the completed application for EA to the competent authority (i.e., the DFFE) in terms of Regulations 5 and 16 of the 2014 EIA Regulations (GNR 326), as amended.
- Undertaking a public participation process in accordance with Chapter 6 of GNR 326 and the Department of Environmental Affairs (2017) Public Participation guidelines in terms of the NEMA EIA Regulations (hereinafter referred to as "the Guidelines") in order to obtain comments on and identify issues and concerns associated with the proposed project.
- Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR 326), as amended, and the requirements of the Specialist Protocols published in Regulation GNR 320, issued on 20 March 2020 and GNR 1150 of 30 October 2020, where relevant, as well as other relevant guidelines.
- Preparation of a Scoping Report and Plan of Study for the EIA in accordance with the requirements of Appendix 2 of the 2014 EIA Regulations (GNR 326).
- Provision of a 30-day public and authority review period for the Scoping Report.
- Preparation of a Comments and Response (C&R) Report detailing all comments raised by I&APs and responses provided as part of the Scoping Phase.
- Submission of a Final Scoping Report, including a Plan of Study for the EIA, to the DFFE for review and acceptance on **6 September 2022**.

Table 7.3 provides a summary of the public participation process undertaken during the Scoping Phase.

Table 7.3: Summary of the public participation process undertaken during the Scoping Phase

Activity	Date
Announcement of the availability of the Scoping Report for a 30-day review and comment period, including details on how to access the Scoping Report via the online stakeholder engagement platform, in one provincial newspaper: » Limpopo Mirror Newspaper (English advert)	22 July 2022
Distribution of the BID, process notification letters and stakeholder reply form announcing the EIA process and inviting I&APs to register on the project database. The BID and electronic reply form was also made available on the online stakeholder engagement platform.	25 July 2022
Placement of site notices at the project site, including placement of further notices in the town of Mopane and Musina.	25 July 2022
Distribution of notification letters announcing the availability of the Scoping Report for a 30-day review and comment period. These letters were	26 July 2022

Activity	Date
distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners) and key stakeholder groups.	
30-day review and comment period of the Scoping Report.	Tuesday, 26 July 2022 – Friday, 26 August 2022
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions. Direct in-person consultation will only take place in limited numbers and where sanitary conditions can be maintained at all times.	» Focus group meetings were held with local and district municipalities, organs of state and commenting authorities and landowners on **Wednesday, 17 August 2022 at 10:30 – 11:30, 12:00 – 13:00 and 13:30 – 14:30** via a virtual platform. No participants attended the meeting scheduled for **10:30 – 11:30**. Apologies were rendered by the only landowner that had confirmed their attendance for the **13:30 – 14:30** meeting. The developer indicated that they would schedule a meeting to go through the presentation and Scoping Reports with the landowner.
On-going consultation (i.e., telephone liaison; e-mail communication) with all I&APs.	» Throughout the EIA process

Table 7.4: DFFE requirements and response/ reference to section in the EIA Report

DFFE Requirement for EIA	Response/Location in this EIA Report
(a) Listed Activities	
(i) The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	The EIA Report provides an assessment of the impacts and mitigation measures for each of the listed activities applied for within Chapters 8 and 9 and within the specialist reports contained within **Appendix D-I.**
(ii) The listed activities represented in the EIAr and the application form must be the same and correct.	The listed activities applied for in the application form submitted to the DFFE on **26 July 2022** are the same as those included in this EIA Report.
(iii) The EIAr must assess the correct sub listed activity for each listed activity applied for.	The EIA Report assesses the correct sub listed activity for each listed activity applied for.
(b) Public Participation	
(i) Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. This includes but is not limited to this Department's World Heritage Management section, regarding the Vhembe Biosphere Reserve (Ms Thumeka Ntloko at tntloko@dffe.gov.za), Department of Agriculture, Land Reform, and Rural Development (DALRRD), Department of Communications and Digital Technologies, South African Civil Aviation Authority (SACAA), South African Heritage Resources Agency (SAHRA), Telkom SA SOC Limited, Transnet SA SOC Limited, Limpopo Department Economic Development, Environment and Tourism (LDEDET), Limpopo Department of Transport and Community Safety, The Limpopo Provincial Heritage Resources Authority (LIHRA), Vhembe District Municipality, Musina Local Municipality, BirdLife South Africa, Endangered Wildlife Trust (EWT), Wildlife and Environment Society of South Africa (WESSA), SANParks, and interested & Affected Parties (I&APs).	All comments received to date have been included within the Comments and Responses Report (**Appendix C6: Comments Received**). Where comments have not been obtained, proof that attempts were made to obtain comments has been included in **Appendix C4: Organs of State Correspondence** and **Appendix C5: Stakeholder Correspondence**. The database detailing registered I&APs is included as **Appendix C1: I&AP Database** to the EIA Report.
(ii) Please ensure that all issues raised and comments received during the circulation of the draft SR and draft EIAr from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final EIAr. Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	Issues raised and comments received during the 30-day review and comment period of the Scoping Report have been captured in this C&RR. Those that will be raised on the EIA Report will be captured and addressed in the Comments and Reponses Report (**Appendix C8: Comments and Responses Report**) and will be submitted with the final EIA Report to the DFFE for decision-making. Proof of additional correspondence with the various stakeholders will be included in the final EIA Report in **Appendix C4: Organs of State** and **Appendix C5: Stakeholder Correspondence**. Where comments have not been obtained, proof that attempts were made to obtain comments will be included in **Appendix C4: Organs of State** and **Appendix C5: Stakeholder Correspondence** of the final EIAr.

DFFE Requirement for EIA	Response/Location in this EIA Report
(iii) A Comments and Response trail report (C&R) must be submitted with the final EIAr. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Appendix 1 of this comments letter. Please refrain from summarising comments made by i&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&AP's comments.	The C&RR includes all the comments and issues submitted on the proposed project and have been captured in this C&RR which is attached as **Appendix C8: Comments & Responses Report** of the EIAr including the comments received from the DFFE. Comments received have not been summarised for inclusion in the C&RR and have been captured verbatim. All comments have been responded to adequately, as applicable, and no comments have been responded to as "noted".
(iv) Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.	Comments have not been split and arranged into categories and have been captured in chronological order according to the date received. Comments from each submission have been responded to individually.
(v) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations, 2014, as amended.	The Public Participation Process has been conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended (GNR 326) (refer to **Appendix C: Public Participation Process** and **Table 7.3** of the EIAr). All relevant activities applied for in the application for Environmental Authorisation (EA) and included in this EIA Report are relevant to the Mutsho Solar PV3 and its associated infrastructure as described in the project description (refer to Section 7.2.1, Table 7.1).
(c) Layout and Sensitivity Maps	
(i) The EIAr must provide the four corner coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	The corner co-ordinates of the project site are included in Table 1.1 of the EIA Report. The power line is the subject of a separate application for authorisation and is therefore not included within the EIA Report.
(ii) The EIAr must provide the following: – Clear indication of the envisioned area for the proposed solar energy facility; i.e. placing of solar panels and all associated infrastructure should be mapped at an appropriate scale. – Clear description of all associated infrastructure. This description must include, but is not limited to the following: ➢ Powerlines; ➢ Internal roads infrastructure; and;	A description of all infrastructure associated with the project is presented in **Chapter 2**. The facility layout is included in this EIA Report as **Figure 9.1**. The layout includes all the infrastructure associated with the facility as required. The power line is the subject of a separate application for authorisation and is therefore not included within the EIA Report.

DFFE Requirement for EIA	Response/Location in this EIA Report
➢ All supporting onsite infrastructure such as laydown area, guard house and control room etc. ➢ All necessary details regarding all possible locations and sizes of the proposed satellite substation and the main substation.	
(iii) A copy of the final preferred route layout map. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following: ➢ Permanent laydown area footprint; ➢ Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); ➢ Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; ➢ The location of sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; ➢ Substation(s) and/or transformer(s) sites including their entire footprint; ➢ Location of access and service roads; ➢ Connection routes (including pylon positions) to the distribution/transmission network; ➢ All existing infrastructure on the site, especially railway lines and roads; ➢ Buffer areas; ➢ Buildings, including accommodation; and ➢ All "no-go" areas.	The facility layout is included in this EIA Report as **Figure 9.1**. The layout includes all the infrastructure associated with the facility as required. A map showing the layout overlain on the identified environmental sensitivities is included in this EIA Report as **Figure 11.1**.
(iv) An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	A map showing the layout overlain on the identified environmental sensitivities is included in this EIA Report as **Figure 11.1**.
(v) A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	A map showing the layout overlain on the identified environmental sensitivities is included in this EIA Report as **Figure 11.1**.
(d) Specialist Assessments	
(i) (i) The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: ➢ A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisations.	The terms of reference for the specialist studies include the required information. The terms of reference, methodology followed and limitations for these studies are detailed within the specialist reports contained in **Appendix D-I**.

DFFE Requirement for EIA	Response/Location in this EIA Report
➢ Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed.	
➢ Please note that the Department considers a `no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas.	The Department's definition of 'no-go' area is noted and has been considered within this EIA Report. The 'no-go' areas identified by the specialists have been considered by the developer when designing the facility layout.
➢ Should the specialist definition of 'no-go' area differ from the Departments definition; this must be clearly indicated. The specialist must also indicate the `no-go' area's buffer if applicable.	The specialist's definition of 'no-go' area is the same as that of the Department and various 'no-go' areas, including their associated buffer areas, have been recommended by the specialists and have been considered by the developer when designing the facility layout.
➢ All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA.	All specialist studies attached to this EIA Report (refer to **Appendix D – I**) are final and provide detailed and practical mitigation measures and recommendations.
➢ Should a specialist recommend specific mitigation measures, these must be clearly indicated.	The mitigation and enhancement measures proposed by the specialists are included in **Chapters 9 and 10** of the EIA Report, as well as the project EMPr which is attached as **Appendix K** to the EIA Report.
➢ Regarding cumulative impacts: – Clearly defined cumulative impacts and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land. – A detailed process flow to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. – Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process. – The significance rating must also inform the need and desirability of the proposed development. – A cumulative impact environmental statement on whether the proposed development must proceed.	Several renewable energy facilities within a 30km radius of the proposed development have been identified and are detailed in **Chapter 10** of the EIA Report. An evaluation of potential cumulative impacts is included in **Chapter 10** of the EIA Report as well as within the specialist reports included in **Appendix D to I**.

DFFE Requirement for EIA	Response/Location in this EIA Report
(ii) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.	The appointed specialists do not specify contradicting recommendations.
(e) General	
(i) The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under Annexure 2 below.	**Table 2.1** of the EIA Report provides the technical details for the proposed facility, as well as their description and/or dimensions.
(ii) Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies must be indicated.	Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies are provided in Chapter 2 of the EIA Report.
(iii) Should a Water Use License be required, proof of application for a license needs to be submitted.	A water use authorisation will be required as detailed in the report. The application will be submitted once the project is selected as a Preferred Bidder project, in accordance with the requirements of the Department of Water and Sanitation (DWS).
(iv) The EAP must provide landowner consent for all farm portions affected by the proposed project, whether the project component is linear or not, i.e. all farm portions where the access road, solar panels and associated infrastructure is to be located.	The landowner consent for the Solar Energy Facility is included as **Appendix 3** to the amended EA Application form submitted on **13 January 2023**.
(v) An EMPr will be compiled in accordance with the requirements of Appendix 4 of the EIA Regulations 2014, amended and submitted together with the EIA Report. In addition, the generic EMPr for substations and grid connection must also be submitted with the EIAr.	The facility EMPr is included within **Appendix K** of the EIA Report. The substation Is associated with Mutsho PV1. No additional substation is included for Mutsho PV4. Therefore, a generic EMPr is not applicable.
(vi) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAr.	The facility EMPr includes both a construction and operation phase EMPr.
The applicant is hereby reminded to comply with the requirements of Regulation 45 of GN R982 of 04 December 2014, as amendment, with regard to the time period allowed for complying with the requirements of the Regulations.	The submission of the final EIAr will comply with the prescribed timeframes of the EIA Regulations, 2014, as amended.
You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.	The applicant is aware of this requirement.

7.4 Overview of the EIA Phase

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

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

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

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

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

In terms of GNR 779 of 1 July 2016, the DFFE is the competent authority for all projects which relate to the IRP and any updates thereto. As the project is proposed within the Limpopo Province, the LDEDET is the provincial commenting authority for the project. Consultation with these authorities, as well as other relevant Organs of State will continue throughout the Scoping Phase. To date, this consultation has included the following:

- Submission of the application for EA and the draft Scoping Report to the DFFE via the DFFE Novell Filr System on **26 July 2022**.
- Submission of the final Scoping Report on **6 September 2022**.

» Receipt of acceptance of the Scoping Report and approval of the Plan of Study for the EIA Phase on **19 October 2022**.

The following steps are to be undertaken as part of the EIA Phase of the process:

» Make the EIA Report available for a 30-day public review and comment period from **13 January 2023** to **13 February 2023.**
» Notification and consultation with stakeholders, I&APs and Organs of State that may have jurisdiction over the project, including provincial and local government departments, and State-Owned Enterprises.
» Incorporating comments received during the 30-day public review and comment period into the final EIA Report.
» Submission of the final EIA Report to DFFE for decision making.

The submissions, as listed above, were undertaken electronically, as required by the DFFE. A record of all authority correspondence undertaken during the Scoping Phase is included in **Appendix B**.

7.4.2 Public Participation Process

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

The Public Participation Process for Mutsho Solar PV3 has been run concurrently with the public consultation for Mutsho Solar PV2, Mutsho Solar PV3 and Mutsho Solar PV4, located adjacent to the project site. The benefit to the stakeholder is that all information relevant to all related applications has been made available for review together, and not only for comments to be raised across the four (4) applications at one time, but also provided a complete picture of the potential for impacts and/or benefits related to the suite of projects located in close proximity to one another.

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

During the **Scoping Phase**:
» Provide an opportunity to submit comments regarding the project.
» Assist in identifying reasonable and feasible alternatives, where required.
» Contribute relevant local information and knowledge to the environmental assessment.
» Allow registered I&APs to verify that their comments have been recorded, considered, and addressed, where applicable, in the environmental investigations.
» Foster trust and co-operation.
» Generate a sense of joint responsibility and ownership of the environment.
» Comment on the findings of the Scoping Phase results.
» Identify issues of concern and suggestions for enhanced benefits.

During the **EIA Phase**:

» Contribute relevant local information and knowledge to the environmental assessment.
» Verify that issues have been considered in the environmental investigations as far as possible as identified within the Scoping Phase.
» Comment on the findings of the environmental assessments.
» Attend Focus Group Meetings, Key Stakeholder Workshop and in-person Public Meetings to be conducted for the project.

During the **decision-making phase**:

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

The Public Participation process therefore aims to ensure that:

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

The following sections detail the tasks undertaken as part of the public participation process within the EIA Phase.

i. Advertisements and Notifications

The availability of the EIA Report for review and comment was announced to the Organs of State, potentially affected and adjacent landowners, tenants and occupiers, and the general public via the following:

» Notification letter distributed to all registered I&APs advising them of the availability of the EIA Report for review on comment on **12 January 2023.**
» An advertisement announcing the availability of and inviting comment on the EIA Report in the Limpopo Mirror Newspaper (English advertisement) on **13 January 2023**. A copy of the newspaper advert as sent to the newspaper is included an **Appendix C2** of the EIA Report. The advert tear sheet is included in the final EIA Report as **Appendix C2**.
» The EIA Report is available for review and comment by I&APs for a 30-day period from **13 January 2023** to **13 February 2023.** The EIA Report is available on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/mutsho/ I&APs will be encouraged to review the EIA Report and submit written comment. The EIA Report will be circulated to Organs of State via electronic transfer (Dropbox, WeTransfer, etc), or CD and/or hardcopy as per individual request. Evidence of distribution of the EIA Report will be included in the final EIA Report as **Appendix C4** and **Appendix C5**.

ii. Public Involvement and Consultation

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

- Opportunity to review the EIA Report for a 30-day review and comment period from **13 January 2023** to **13 February 2023.**
- Comments received during this review period will be captured within a Comments and Responses Report (**Appendix C8**), which will be included within the final EIA Report.
- Public Consultation Meetings: Virtual focus group meetings with key government departments, stakeholders and landowners. The purpose of these meetings will be to provide an overview of the findings of the EIA studies in order to facilitate comments on the EIA process and the content of the EIA Report, as well as to record any issues or concerns raised by stakeholders regarding the project, environmental studies and mitigation measures. Where necessary or required, face-to-face meetings will be held. The minutes of these meetings will be included in the final EIA Report as **Appendix C7**.
- Telephonic consultation sessions.
- Written, faxed or e-mail correspondence.

Table 7.5: Public involvement during EIA Phase

Activity	Date
Advertising of the availability of the EIA Report for a 30-day review and comment period in the Limpopo Mirror Newspaper (English advertisement).	13 January 2023
Distribution of notification letters announcing the availability of the EIA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	12 January 2023
30-day review and comment period of the EIA Report.	13 January 2023 to 13 February 2023
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations).	Virtual Focus Group Meetings, Key Stakeholder Workshop and in-person Public Meetings will be held during the EIA Phase.
On-going consultation (i.e., telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA process

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

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

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

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

attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

(2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to –
   (a) A lack of skills to read or write;
   (b) Disability; or
   (c) Any other disadvantage;
   Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database have been notified by means of a notification letter of the release of the EIA Report for a 30-day review and comment period, invited to provide comment on the EIA Report, and informed of the manner in which, and timeframe within which such comment must be made. The report is available in soft copies to I&APs. Hard copies of the report are available on request.

The EIA Report is available on the Savannah Environmental website (i.e., online stakeholder engagement platform) https://savannahsa.com/public-documents/energy-generation/mutsho/). A notification letter to all registered I&APs was distributed on **12 January 2023**. Where I&APs are not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions and face-to-face discussions will be used.

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period will be recorded and included in **Appendix C7 and C8** of the final EIA Report.

iv. Identification and Recording of Comments

Comments raised by I&APs to date have been included into a Comments and Responses (C&R) Report, which is included in **Appendix C8** of this EIA Report. The C&R Report includes detailed responses from members of the EIA project team, applicant and/or relevant specialist to the issues and comments raised. The C&R Report will be updated with all comments received during the 30-day review and comment period of the EIA Report and will be included as **Appendix C8** in the final EIA Report submitted to the DFFE for decision-making.

Notes of all the telephonic discussions, virtual meetings, and face-to-face meetings (if any) to be conducted during the 30-day review and comment period of the EIA Report will be included in **Appendix C7** of the final EIA Report.

7.5 Outcome of the DFFE Web-Based Screening Tool

In terms of GNR 960 (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 Regulations 19 and 21 of the EIA Regulations.

The requirement for the submission of a Screening Report (included as **Appendix K** of the EIA Report) for Mutsho Solar PV3 is applicable as it triggers Regulation 19 of the EIA Regulations, 2014, as amended. **Table 7.6** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team considering the project site under consideration.

Table 7.6: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of Mutsho Solar PV3.

Environmental Theme/Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agriculture Theme/Agricultural Impact Assessment	Medium	A Soils and Agricultural Potential Assessment Report is included in this EIA Report as **Appendix G**.
Landscape (Solar) Theme/Visual Impact Assessment	Very High	A Visual Impact Assessment has been undertaken for the Solar Energy Facility and is included in this EIA Report as **Appendix I.**
Archaeological and Cultural Heritage Theme/Heritage Impact Assessment	High	A full Heritage Impact Assessment (including an assessment of archaeological heritage resources and the cultural landscape) has been undertaken for the Solar Energy Facility and is included in this EIA Report as **Appendix H**.
Palaeontology Theme/Heritage Impact Assessment	Very High	A full Heritage Impact Assessment (including an assessment of archaeological heritage resources and the cultural landscape) has been undertaken for the Solar Energy Facility and is included in this EIA Report as **Appendix H**.
Terrestrial Biodiversity Theme/ Terrestrial Ecology Impact Assessment	Very High	A Terrestrial Ecology Impact Assessment has been undertaken for the Solar Energy Facility and is included as **Appendix D** of the EIA Report.
Aquatic Biodiversity Theme/Freshwater Impact Assessment	Very High	A Freshwater Impact Assessment has been undertaken for the Solar Energy Facility and is included as **Appendix E** of the EIA Report.
Avian Impact Assessment/Avifauna Impact Assessment	Very High	An Avifauna Impact Assessment has been undertaken for the Solar Energy Facility and included as **Appendix F** of the EIA Report. 12-months pre-construction monitoring as per the BirdLife SA Best Practice Guidelines has been completed and and has informed the assessment of impacts.
Civil Aviation (Solar PV) Theme	Low	No major aerodromes or small airfields are known to occur in the larger area. The Civil Aviation Authority (CAA) and Air Traffic Navigation Services (ATNS) will be consulted throughout the S&EIA process to obtain input. A compliance statement is included as **Appendix O** of the EIA Report.
Defence Theme	Low	There is no military base located within close proximity to the proposed project.
RFI Theme	Medium	The project site is not located near any SKA receptors as the site is not in the Northern Cape. The South African Radio Astronomy Observatory (SARAO) will however be consulted during the 30-day review and comment period of the Scoping Report to provide written comment on the proposed development.
Plant Species Theme/ Terrestrial Ecology Impact Assessment	Low	A Terrestrial Ecology Impact Assessment (including flora) has been undertaken for Mutsho Solar PV3 and is included as **Appendix D** of the EIA Report.

Environmental Theme/Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Animal Species Theme/ Terrestrial Ecology Impact Assessment	Medium	
Socio-Economic Assessment	The screening report does not indicate a rating for this theme.	A Socio-Economic Impact Assessment has been undertaken and is included in the EIA Report as **Appendix J**.

7.6 Assessment of Issues Identified throughout the EIA Process

Based on the outcomes of the Scoping Phase evaluation of the project, the following studies were identified as requiring detailed assessment, The specialist consultants involved in the assessment of these impacts are indicated in **Table 7.7** below.

Table 7.7: Specialist studies undertaken as part of the EIA Phase

Specialist	Specialist Study	Appendix
Lindi Steyn and Andrew Husted of the Biodiversity Company	Terrestrial Ecology Impact Assessment	Appendix D
	Freshwater Impact Assessment	Appendix E
	Avifauna Impact Assessment	Appendix F
Matthew Mamera and Andrew Husted of the Biodiversity Company	Soils and Agricultural Potential Impact Assessment	Appendix G
Jenna Lavin of CTS Heritage	Heritage Impact Assessment (including Archaeology Palaeontology and Cultural Heritage)	Appendix H
Jon Marshall of Environmental Planning & Design CC	Visual Impact Assessment	Appendix I
Pierre van Jaarsveld of Urban-Econ Development Economist (Pty) Ltd	Socio- Economic Impact Assessment	Appendix J

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

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

    - 4 is low and will cause a slight impact on processes
    - 6 is moderate and will result in processes continuing but in a modified way
    - 8 is high (processes are altered to the extent that they temporarily cease)
    - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
    - Assigned a score of 1–5, where 1 is very improbable (probably will not happen)
    - Assigned a score of 2 is improbable (some possibility, but low likelihood)
    - Assigned a score of 3 is probable (distinct possibility)
    - Assigned a score of 4 is highly probable (most likely)
    - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures)
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high
- The **status**, which is described as either positive, negative or neutral
- The degree to which the impact can be reversed
- The degree to which the impact may cause irreplaceable loss of resources
- The degree to which the impact can be mitigated

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

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

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

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

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

Specialist studies also considered cumulative impacts associated with similar developments within the broader project site. 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 project developer has the responsibility to avoid or minimise impacts and plan for their management (in terms of the requirements of NEMA and the 2014 EIA Regulations (GNR 326)), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. A facility EMPr and a generic substation EMPr that include all the mitigation measures recommended by the specialists for the management of significant impacts are included as **Appendix O1 and O2** to this EIA Report.

7.7 Assumptions and Limitation of the EIA Process

The following assumptions and limitations are applicable to the EIA process for Mutsho Solar PV3:

- All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- The project site identified by the developer represents a technically suitable site for the establishment of a Solar Energy Facility, which is based on the design undertaken by technical consultants for the project.
- The development footprint (the area that will be affected during the operation phase) will include the footprint for the Solar Energy Facility and associated infrastructure (i.e., internal access roads, and grid connection infrastructure).
- Conclusions of the specialist studies undertaken, and this overall impact assessment assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset in accordance with the relevant recommendations made.
- 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 contained in **Appendices D - J** for limitations specific to the independent specialist studies.

7.8 Legislation and Guidelines that have informed the preparing of the Scoping Report

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

- National Environmental Management Act (Act No. 107 of 1998).
- EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended).
- Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations.
- 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).

Several other Acts, standards or guidelines have also informed the project process and the scope of issues addressed and assessed in this Scoping Report. A review of legislative requirements applicable to the proposed project as identified at this stage in the process is provided in **Table 7.8**.

Table 7.8: Relevant legislative permitting requirements applicable to Mutsho Solar PV3

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* * *Prevent pollution and ecological degradation,* * *Promote conservation, and* * *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No. 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. Considering the capacity of the proposed Mutsho Solar PV3 (i.e., contracted capacity of 100MW) and the triggering of	DFFE – Competent Authority LDEDET – Commenting Authority	The listed activities triggered by the proposed project have been identified and are being assessed as part of the EIA process currently underway for the project. The EIA process will culminate in the submission of a Final EIA Report to DFFE for review and decision-making.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Activity 1 of Listing Notice 2 (GNR 325), a full Scoping and EIA process is required in support of the Application for EA.		
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DFFE LDEDET	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North-West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce, or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DFFE LDEDET Musina Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the location of the project site in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule	DWS	Freshwater/drainage features are present within the project site of Mutsho Solar PV3 as

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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. Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).		identified in the Freshwater Impact Assessment (**Appendix E**). The overall extent of natural wetland areas expected for the project area is limited; however, previous assessments of the project area have delineated water resources for the project area. Digby Wells (2018) delineated a network of drainage features across the project area, with the ARC-Institute (2018) indicating a potential wetland flowing through the centre of the project area in a northerly direction. Desktop information also suggests the presence of drainage features. Furthermore, it is the developer's intention to abstract water from existing boreholes during the construction and operation phases. A septic tank, which will be regularly emptied by a service provider, will be installed at the admin building. As a result, a water use authorisation for the project may be required from the DWS. The process to be undertaken will only be confirmed and completed once a positive EA has been received and the project selected as Preferred Bidder. This is in line with the requirements from the DWS.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy (DMRE)	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an EA in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.		In terms of Section 53 of the MPRDA, approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.	LDEDET / Vhembe District Municipality	In the event that the project results in the generation of excessive levels of dust, the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.	South African Heritage Resources Agency (SAHRA) Limpopo Heritage Resources Authority (LIHRA) – provincial heritage authority	A full Heritage Impact Assessment has been undertaken as part of the EIA process (refer to **Appendix H** of the EIA Report). According to the Heritage Impact Assessment, even though the area is rich in history, no significant archaeological heritage resources were identified during the field assessment. The most significant site identified in the vicinity of the development is Site V04. It is recommended that Site V04, the Boabab Room, must not be impacted by any activity

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		and any proposed activity on this farm must adhere to a buffer area of 100m around this site. The site is located a significant distance from the area proposed for development. No archaeological sites of scientific value were identified within proximity of the area proposed for development in both the 2017 and 2022 site visits. A field assessment identified no fossil remains within the footprint of the proposed development area. Should a heritage resource be impacted upon, a permit may be required from SAHRA or the Limpopo Provincial Heritage Resources Authority in accordance with Section 48 of the NHRA, and the SAHRA Permit Regulations (GNR 668).
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR),	DFFE LDEDET	Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species. A Terrestrial Ecology Impact Assessment has been undertaken as part of the EIA process. Ground truthing confirmed 2 Species of Conservation Concern to be present within the study area (refer to **Appendix D**). These were exclusively protected species from a provincial perspective, and none of them are Red List species. No species listed under NEM:BA were identified. Should any species

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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			» Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4. » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	DFFE	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals. A Terrestrial Ecology Impact Assessment has been undertaken as part of the EIA process to identify the presence of any protected trees present on site which will require a

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			permit. During the field assessment 3 species of protected trees were observed: *Boscia albitrunca (*Shepard's tree), *Adansonia digitata* (Baobab), and *Sclerocarya birrea subsp. caffra* (Marula). The protected trees observed are protected by the List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA). In terms of the NFA, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Should any other species be affected by the project, a permit would be required to be obtained.
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it.	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of Mutsho Solar PV3, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.		
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the DoH.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented.	DFFE – Hazardous Waste DEDET – General Waste	No waste listed activities are triggered by Mutsho Solar PV3, therefore, no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM: WA will need to be considered in this regard.
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public	South African National Roads Agency (SANRAL) – national roads	An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	Limpopo Department of Public Works	dimensioned loads and transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation and BESS components may not meet specified dimensional limitations (height and width) which will require a permit.
	Provincial Policies / Legislation		
The Mpumalanga Nature Conservation Act (Act 10 of 1998)	This Act makes provision with respect to nature conservation in the Mpumalanga province. It provides for, among other things, protection of wildlife, hunting, fisheries, protection of endangered fauna and flora as listed in the Convention on international Trade in Endangered Species of Wild Fauna and Flora, the control of harmful animals, freshwater pollution, and enforcement.	LDEDET	A collection/destruction permit must be obtained from LDEDET for the removal of any protected plant or animal species found on site. Should these species be confirmed within the development footprint during any phase of the project, permits will be required. Ground truthing confirmed 2 Species of Conservation Concern to be present within the study area (refer to Appendix D). These were exclusively protected species from a provincial perspective, and none of them are Red List species. Permits will be required to impact directly on these species.

7.8.1 Best Practice Guidelines Birds & Solar Energy (2017)

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

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

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

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

Data collection could vary from a single, short field visit (Regime 1, for e.g. at a small or medium sized site with low avifaunal sensitivity), to a series of multi-day survey periods, including the collection of various forms of data describing avian abundance, distribution and movement and spread over 12 months (Regime 3, for e.g. at a large developments located in a sensitive habitat, or which otherwise may have significant impacts on avifauna). **Table 7.7** is taken from the best practise guidelines and provides a summary of the recommended assessment regimes in relation to proposed solar energy technology, project size, and likely risk).

Table 7.7: Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.

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

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

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

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

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

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

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

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

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

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

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

Bird distribution patterns fluctuate widely in response to environmental conditions (e.g., local rainfall patterns, nomadism, migration patterns, seasonality), meaning that a composition noted at a particular moment in time will differ during another time period at the same locality. The field survey was undertaken during 20-24 June 2022. Effort was made to cover all the different habitat types within the limits of time and access. Areas surrounding the project area were also surveyed, this included areas on the river just south of the project area

7.8.2 The IFC Environmental Health and Safety (EHS) Guidelines

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

» IFC EHS General Guidelines
» IFC Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, however no Industry Sector EHS Guidelines have been developed for PV solar power to date.

The application of the General EHS Guidelines should be tailored to the hazards and risks associated with a project, and should take into consideration site-specific variables which may be applicable, such as host country context, assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

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

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

While no Industry Sector EHS Guidelines have been developed for PV Solar Power, the IFC has published a Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (IFC, 2015). Chapter 8 of the Project Developer's Guide pertains to Permits, Licensing and Environmental Considerations, and states that in order to deliver a project which will be acceptable to international lending institutions, environmental

and social assessments should be carried out in accordance with the requirements of the key international standards and principles, namely the Equator Principles and IFC's Performance Standards (IFC PS).

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

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

CHAPTER 8: DESCRIPTION OF THE AFFECTED ENVIRONMENT

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

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

This chapter includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(h)(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	The environmental attributes associated with the development of Mutsho Solar PV3 are included as a whole within this chapter. The environmental attributes that are assessed within this chapter include the following: » The regional setting of the broader study area indicates the geographical aspects associated with Mutsho Solar PV3. This is included in **Section 8.2**. » The climatic conditions for the Mopane area, which is the closest town to the site, have been included in **Section 8.3**. » The biophysical characteristics of the project site and the surrounding areas are included in **Section 8.4**. The characteristics considered are topography and terrain, geology, soils and agricultural potential and the ecological profile which includes the vegetation patterns, listed plant species, critical biodiversity areas and broad-scale processes, freshwater resources, terrestrial fauna and avifauna. » The heritage and cultural aspects (including archaeology and palaeontology) have been included in **Section 8.5**. » The visual quality of the surrounding area and the project site has been considered in **Section 8.6**. » The social and socio-economic characteristics associated with the broader study area and the project site have been included in **Section 8.7.**

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

8.2. Regional Setting

8.2.1. Location of the Project Site

The proposed project site is located approximately 8km south-west of Mopane, approximately 39km south-west of the town of Musina; and approximately 40km north-north-east of the town of Makhado (Louis Trichardt). The site is located in Ward 2 in the south-central extent of the Musina Local Municipality, of Limpopo's Vhembe District (refer to **Table 8.1**).

Table 8.1: Overview of the Identified Site

Farm Name:	Area (ha)	Central Coordinates	
		Latitude	Longitude
Remaining Extent of Farm Vrienden 589	1 237ha	22°41'27.20"S	29°49'27.37"E

The site is located approximately 12km west of the N1 National Road at the intersection of District Roads D744 and D1021 (refer to **Figure 8.1**). D1021 which can be accessed directly from the N1 provides primary access to the project site, while D744 which runs parallel to the railway line provides.

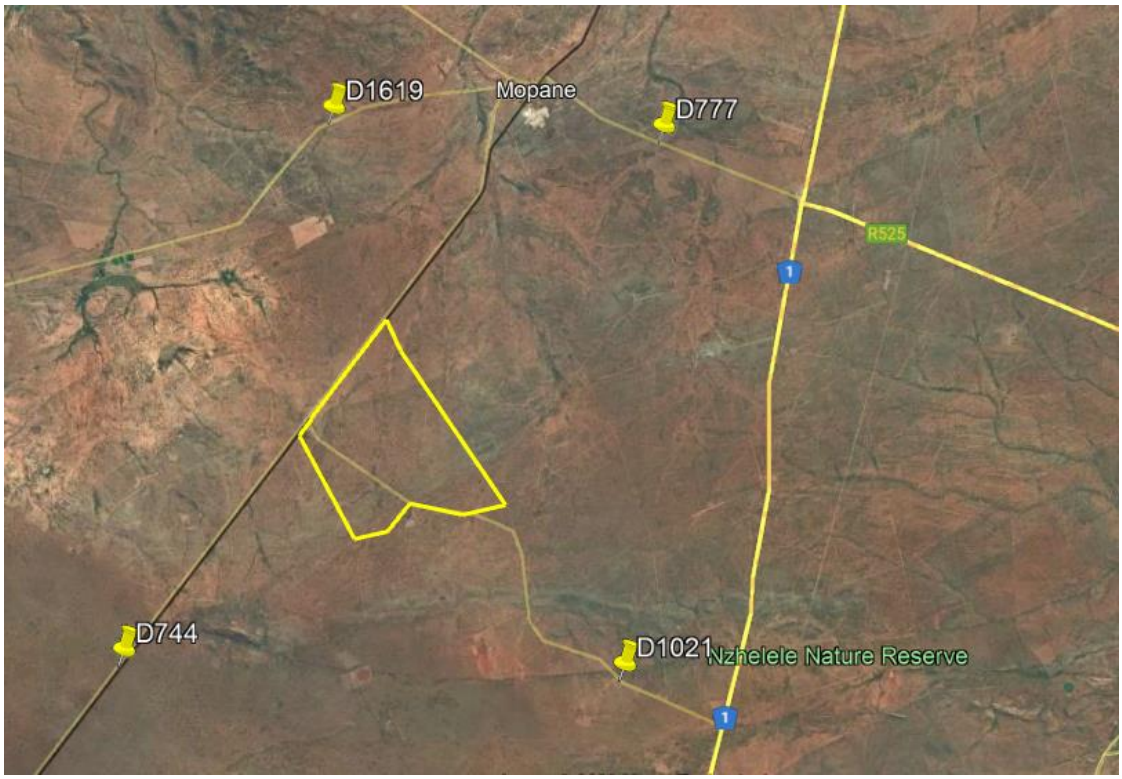


Figure 8.1: Location of the project site relative to the D744 – D1201 intersection

8.2.2. Limpopo Province

Limpopo, South Africa's northern-most province, borders onto Mozambique, Zimbabwe and Botswana. It also borders the Mpumalanga, Gauteng and North West provinces. Named after the Limpopo River, which flows along its northern border, it is a region of contrasts, from true Bushveld country to majestic mountains, primeval indigenous forests, unspoiled wilderness and patchworks of farmland. In the eastern region lies the

northern half of the magnificent Kruger National Park. Limpopo ranks fifth in South Africa in both surface area and population, covering an area of 125 754km² and being home to a population of 5 779 090. The capital is Polokwane (previously Pietersburg). Other major cities and towns include Bela-Bela (Warmbad), Lephalale (formerly Ellisras), Makhado (formerly Louis Trichardt), Musina (formerly Messina), Thabazimbi and Tzaneen.

Mining is the primary driver of economic activity. Limpopo is rich in mineral deposits, including platinum-group metals, iron ore, chromium, high and middle-grade coking coal, diamonds, antimony, phosphate and copper, as well as mineral reserves such as gold, emeralds, scheelite, magnetite, vermiculite, silicon and mica. The province is a typical developing area, exporting primary products and importing manufactured goods and services.

The climatic conditions in the province allow for double harvesting seasons, which results in it being the largest producer of various crops in the agricultural market. Sunflowers, cotton, maize and peanuts are cultivated in the Bela-Bela–Modimolle area. Bananas, litchis, pineapples, mangoes and pawpaw's, as well as a variety of nuts, are grown in the Tzaneen and Makhado areas. Extensive tea and coffee plantations create many employment opportunities in the Tzaneen area. The Bushveld is cattle country, where controlled hunting is often combined with ranching.

Limpopo is divided into five district municipalities, namely, Capricorn, Mopani, Sekhukhune, Vhembe and Waterberg and which are further subdivided into 22 local municipalities (**refer to Figure 8.2**), with the project site falling within the Vhembe District Municipality.

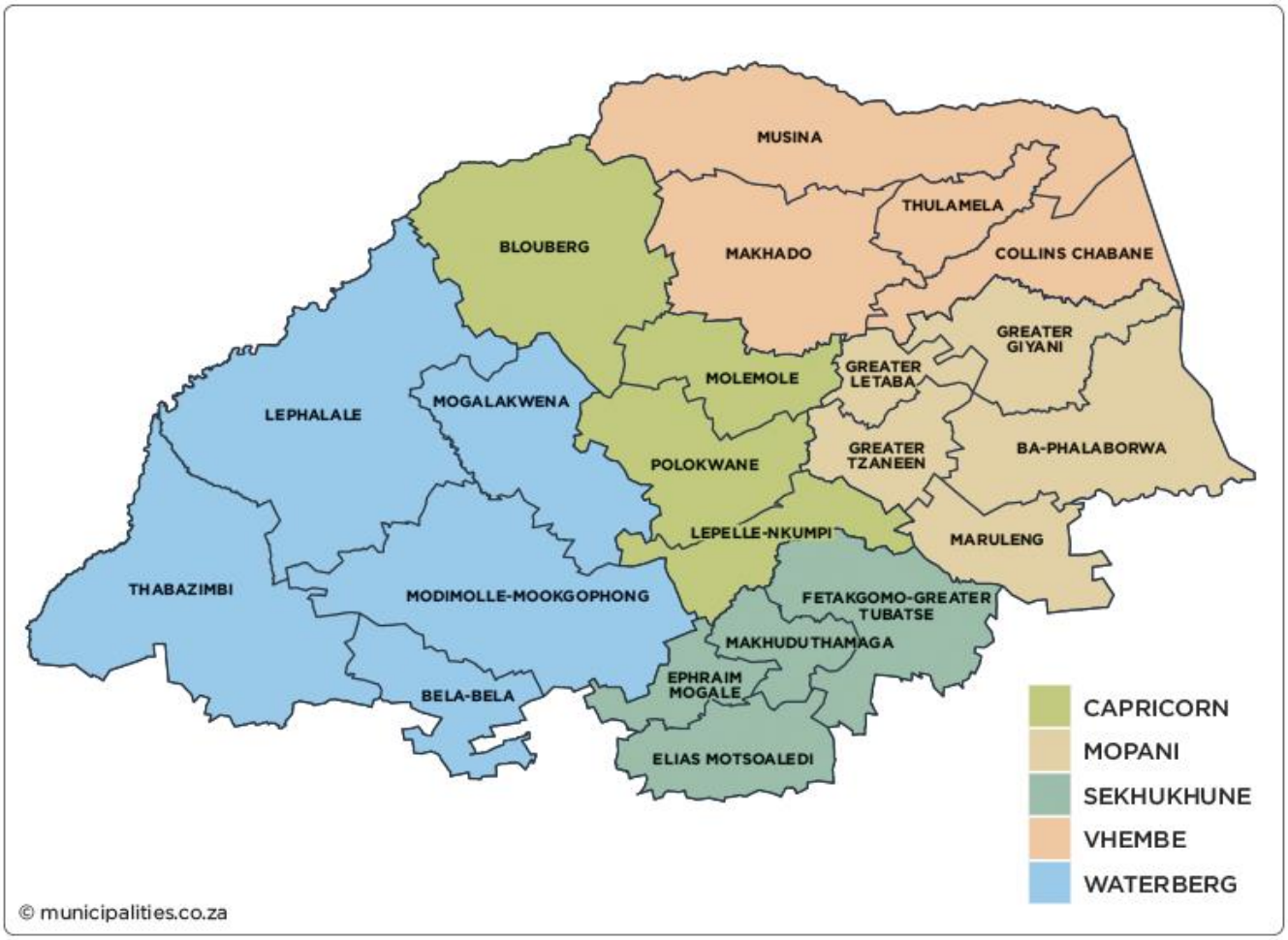


Figure 8.2: District municipalities of the Limpopo Province (Source: www.municipalities.co.za).

8.2.3. Vhembe District Municipality

The Vhembe District Municipality is a Category C municipality, which indicates that the municipality has a municipal executive and legislative authority in an area that includes more than one municipality. The Vhembe District Municipality is one of five (5) Districts which make up the Limpopo Province. The others include: Capricorn, Mopani, Sekhukhune, and Waterberg Districts. Vhembe District is South Africa's northern-most District and is bordered by Zimbabwe to the north, Mopani District to the south, Capricorn District to the south-west, and Waterberg District to the west. It comprises four local municipalities, namely Musina, Thulamela, Makhado, and Collins Chabane (refer to **Figure 8.3**), with the project site falling within the Musina Local Municipality. The Vhembe District Municipality is predominantly rural in nature and is considered a cultural hub and catalyst for agricultural and tourism development.

Figure 8.3: The four municipalities located in the Vhembe District Municipality (Local Government Handbook, 2017)

8.2.4. Musina Local Municipality

The Musina Local Municipality is one of four (4) Local Municipalities which form part of the Vhembe District of Limpopo. It is also the largest of the four (4) Local Municipalities which comprise Vhembe District Municipality. The others include Makhado, Thulamela and Collins Chabane (refer to **Figure 8.3**). Whereas the Vhembe District previously consisted of Musina, Makhado, Thulamela and Mutale Local Municipalities, the defunct Mutale Local Municipality was subsequently disestablished and portions of it merged into the Musina and Thulamela Local Municipalities on 03 August 2016. The Collins Chabane Local Municipality was also subsequently established through the merging of portions of Musina and Thulamela Local Municipalities. The Musina Local Municipality is bordered by Makhado Local Municipality to the south, Thulamela Local Municipality to the east, and by Blouberg Local Municipality of Limpopo's Capricorn District to the south-west. Musina Local Municipality forms the northern-most extent of Limpopo Province and is also bordered by Botswana and Zimbabwe to the north-west and north-east respectively. Musina Local Municipality covers an area of land approximately 757 829ha in extent and extends from the convergence of the Mogalakwena and Limpopo Rivers in the west to the convergence of the Nwanedi and Limpopo Rivers in the east; and from Tshipise and Mopane in the south; to Botswana and Zimbabwe in the north.

According to the Spatial Development Framework (SDF) prepared for the Musina Local Municipality (refer to **Figure 8.4**), the project site is located on land with a medium agricultural potential of 6 and is outside areas identified as having mining potential (shown in **Figure 8.4** in orange). The closest network to the project site is the N1 Primary corridor. Direct access to the N1 Primary Corridor can be obtained via D1201 which originates from the N1 and traverses eastwards, coming to an end at Huntleigh siding. The closest node to the project site is the Primary Node at Musina, followed by the Secondary Node at Beitbridge.

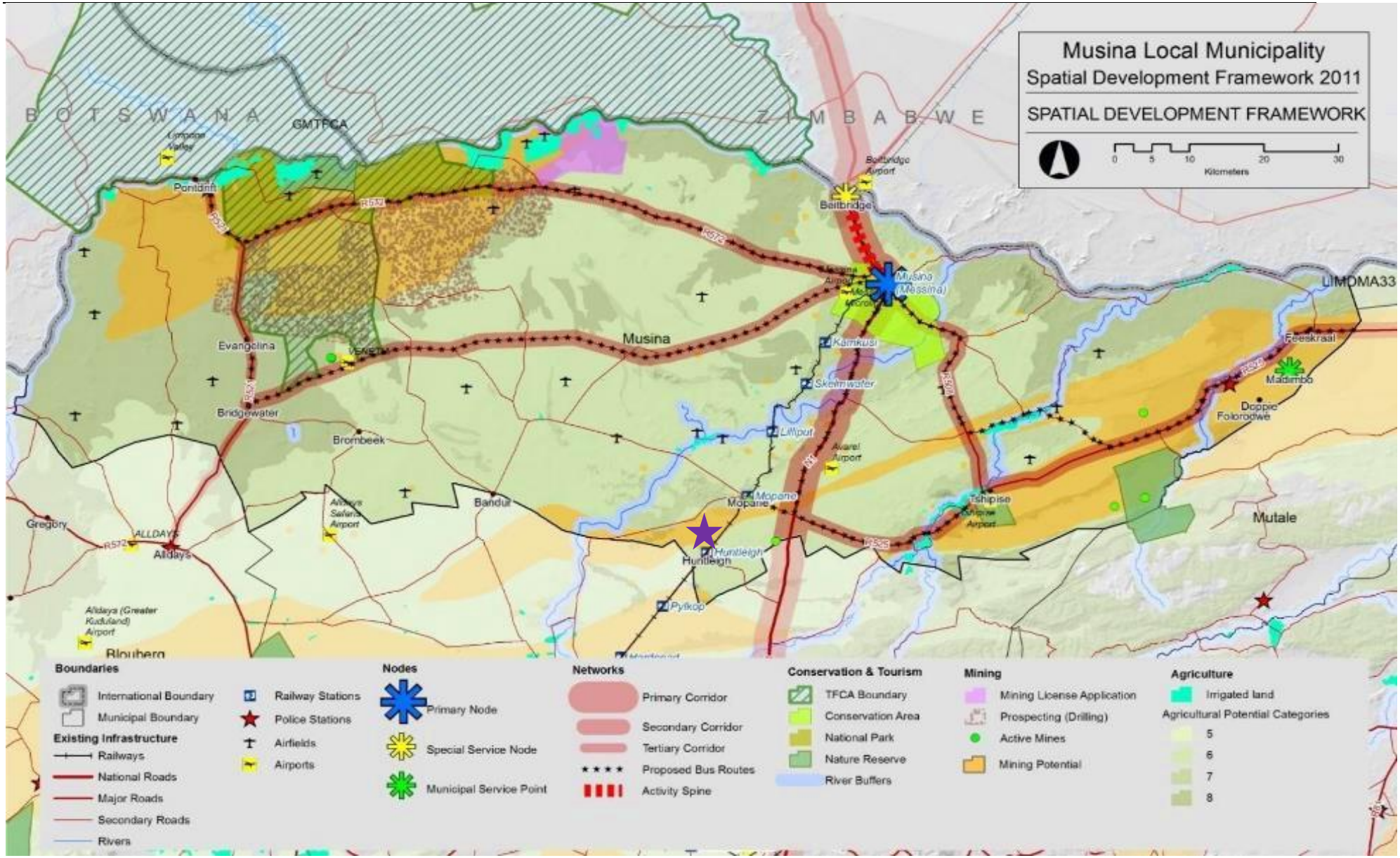


Figure 8.4: Spatial Development Framework for the Musina Local Municipality (project site location depicted by purple star)

8.3. Climatic Conditions

The regional climate is hot, semi-arid, and characterised by hot temperatures throughout most of the year. The area has an annual average precipitation of 372mm and receives most of its rain during the summer months from October to April, when severe thunderstorms are common in the late afternoon and evening (refer to **Figure 8.5**). Winter is extremely dry with almost no precipitation. The driest months of the year are typically from June to August. During this time of year temperatures plunge to close to freezing (0°C) at night, although frost is fairly uncommon. Droughts occur frequently during the winter months, and infrequently during the summer months when very little rain falls and drought conditions prevail. These erratic summer droughts are becoming more common as a result of the effects of climate change within the area . The annual average temperature in Musina is 22.8°C. January is the hottest month of the year with an average temperature of 26.5°C, while June is typically the coldest month of the year with an average temperature of 17.0°C.

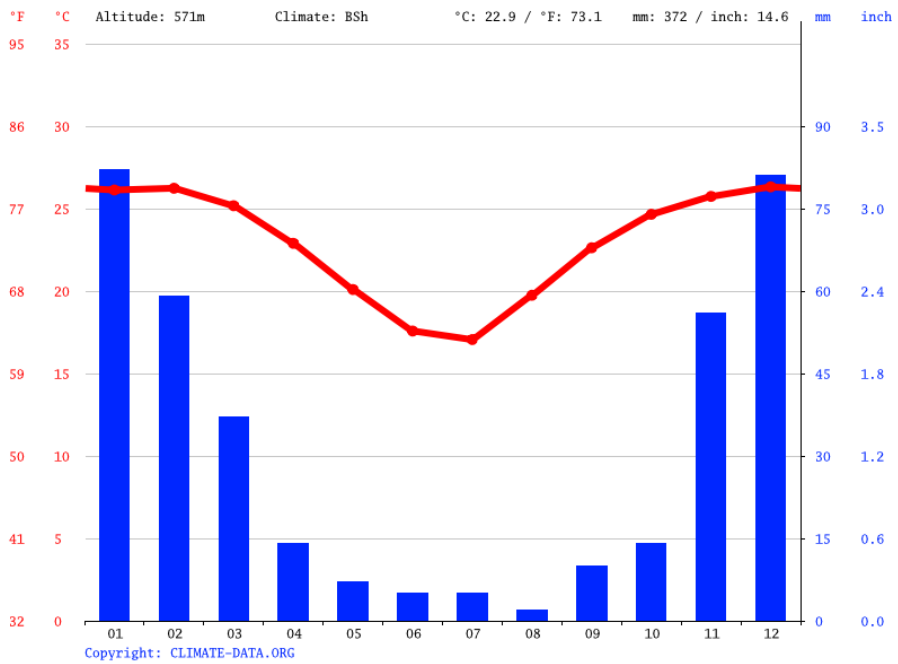


Figure 8.5: Average rainfall data for Musina (https://en.climate-data.org/africa/south-africa/limpopo/musina-935/#climate-graph)

8.4. Biophysical Characteristics of the Study Area and Development Area

The following section provides an overview and description of the biophysical characteristics of the study area and has been informed by specialist studies (**Appendix D-H**) undertaken for this EIA Report.

8.4.1. Topographical profile

The proposed site is located within an area of undulating topography. The Limpopo River is the main regional drainage feature as this river forms the border between the Republic of South Africa and Zimbabwe. The Limpopo River, at its closest, is in excess of 50km from the proposed site.

The rugged Soutpansberg lies approximately 22km to the south and east of the proposed site. A cross section of the landform ranges in elevation between approximately 680 metres above mean sea level (mamsl) at the Limpopo River to the north and 1 400mamsl at the top of the Soutpansberg to the south. By comparison, the proposed project site has current levels between 690 - 730mamsl.

The generally undulating landform that characterises the site is created by a series of water courses within minor valleys that gradually fall towards the Limpopo River. The landform to the north of the site slopes gently towards the Sand River for approximately 11.5km and to the south it falls gently for approximately 13km towards the Mutamba River.

Within the undulating landform, there are a number of koppies and secondary ridgelines that rise up to 130m above the surrounding landform. There are numerous minor koppies to the north of the site as well as two major koppies close and to the south and one major koppie to the north in the vicinity of Mopane.

The slope percentage of the project site has been calculated and is illustrated in **Figure 8.6**. Most of the project site is characterised by a slope percentage between 0 and 10%, with some smaller patches within the project site characterised by a slope percentage in excess of 12%. This illustration indicates a uniform topography with a relatively 'flat' landscape.

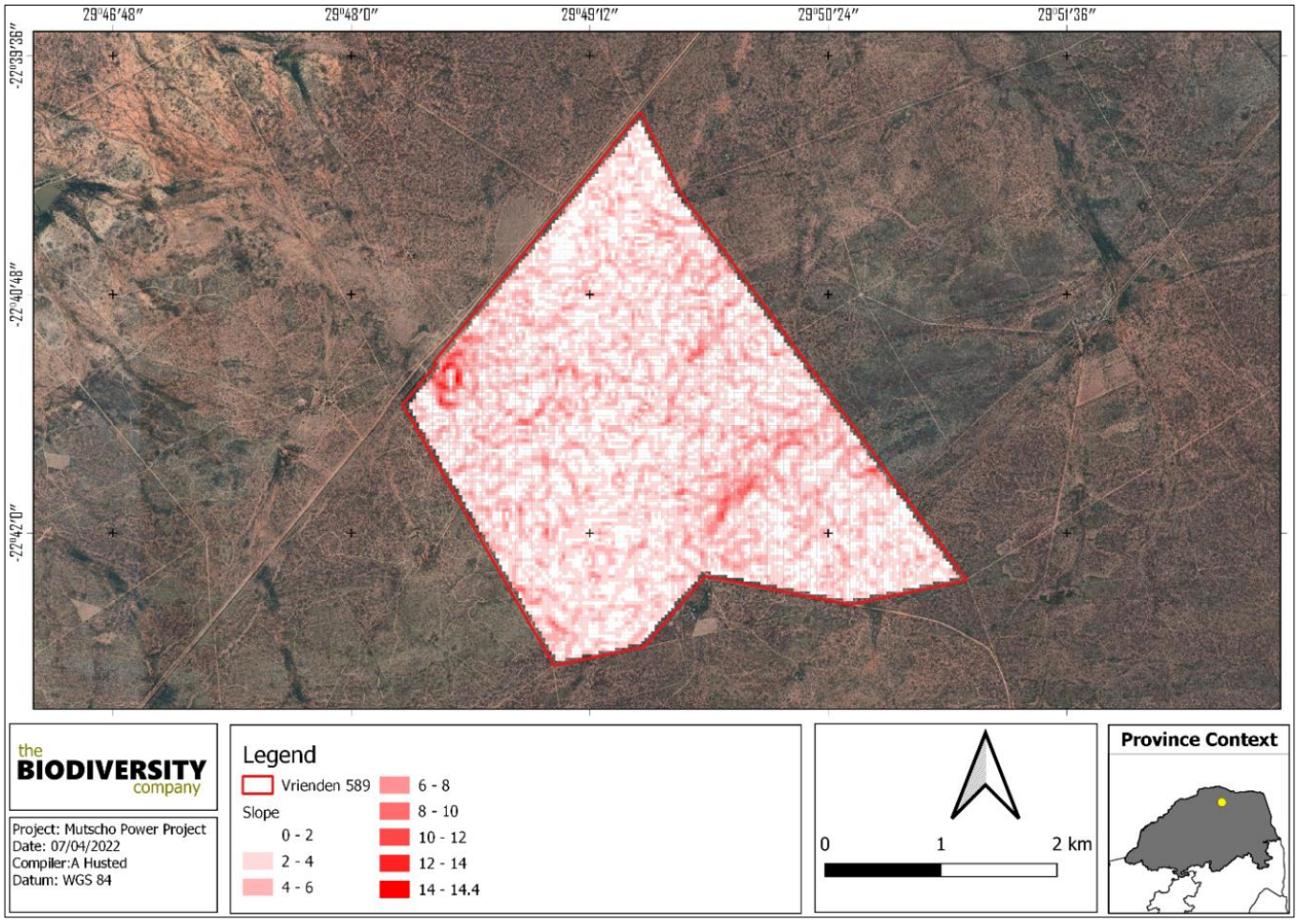


Figure 8.6: Slope percentage calculated for the project site within which Mutsho Solar PV3 is proposed

8.4.2. Geology, Soils, Land Type and Agricultural Potential

Geological Setting of the Project Site

Most of the area is underlain by the Archaean Beit Bridge Complex, except where it is covered by much younger Karoo sandstones and basalts. The Beit Bridge Complex consists of gneisses and metasediments and is structurally very complex.

Soil and Land Types

According to the land type database, the project site falls within the Ah 89 land type. The land terrain units for the Ah 89 land type are illustrated in **Figure 8.7,** with the expected soils listed in **Table 8.2**.

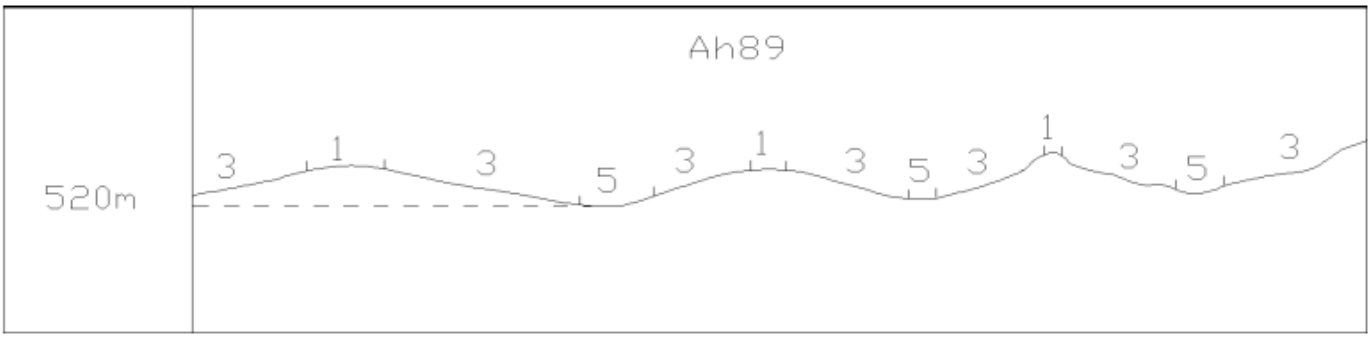


Figure 8.7: Illustration of land type Ah 89 terrain unit

Table 8.2: Soils expected at the respective terrain units within the Ah 89 land type

1 (10%)		3 (75%)		5 (15%)	
Bare Rock	20%	Bare Rock	5%	Clovelly	5%
Mispah	80%	Glenrosa	2%	Oakleaf	70%
		Hutton	63%	Hutton	5%
		Mispah	10%	Bainsvlei	5%
		Clovelly	15%	Stream	15%

Agricultural Potential

Land capability is divided into eight (8) classes, and these may be divided into three (3) capability groups, namely, arable land, grazing land and wildlife. **Table 8.3** shows how the land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use and sensitivity increases from class I to class VIII (Smith, 2006).

Table 8.3: Land capability class and intensity of use (Smith, 2006)

Land capability class	Increased Intensity of Use									
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							
VIII	W									Wildlife

W- Wildlife	**F- Forestry**	**LG-Light Grazing**
MG-Moderate Grazing	IG- Intensive Grazing	LC – Light Cultivation
MC- Moderate Cultivation	IC- Intensive 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 8.4**. The final land potential results are then described in **Table 8.5**. These land potential classes are regarded as the final delineations subject to sensitivity, given the comprehensive addition of climatic conditions as those relevant to the DAFF (2017) land capabilities. The main contributors to the climatic conditions as per Smith (2006) is that of MAP, Mean Annual Potential Evaporation (MAPE), mean September temperatures, mean June temperatures and mean annual temperatures.

Table 8.4: 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 8.5: The land potential classes

LC	**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

Considering the occurrence of various soil forms that are commonly associated with high land capabilities, it is unlikely that areas with high land capability sensitivity occur within the project site. Further to this, due to the poor climatic capability, the ultimate land potential is more likely to be low. More detail will be provided in the EIA Phase.

8.4.3. Land Cover and Land Use

Land use often determines land cover; and is an important contributing factor to the overall condition of the land. This is due to the fact that different land uses have varying effects on the integrity of the land. Areas that are characterised by high levels of transformation and habitat degradation are generally considered to be more suited for development purposes, as it is unlikely that biodiversity attributes of conservation importance will be present or affected by development in such areas. Conversely, areas that are characterised by extensive untransformed and pristine habitat are generally regarded unsuitable options for development purposes. The general region within which the project site is located can be classified as being definitively rural, with very little anthropogenic development and/or transformed environments.

Landcover within the study area can be divided into the following types:

» **Urban development** includes the settlement of Musina, which is loacted approximately 41km to the north east and Makhado (Louis Trichardt), and approximately 39km south of the proposed site. Both Musina and Makhado have well-established middle and upper income housing areas and more recent low cost housing areas. There is also a band of well-established settlements approximately 25km to the south of the proposed site that extends to the east within the Soutpansberg. These settlements include Makusha, Mudimeli, Manyii, Musekwa and Makhado.

  Mopane is a small village that is located approximately 6.5km to the north-east of the proposed site. This small settlement is located on a minor ridgeline. From the southern edge, views over the landscape towards the proposed site are possible. However, vegetation within the settlement is relatively dense.

» **Natural areas** are the main land cover type surrounding the proposed development site. These areas appear to be largely used for game and low intensity cattle grazing. This activity has resulted in the majority of the area retaining a relatively natural appearance. A proportion of landowners also appear to have diversified into tourism as is evident from the number of bush lodges in the area.

  Within the natural areas, there are also a large number of farmsteads that are likely to include; farm sheds, farm houses and workers accommodation. It is also likely that a proportion of these are used as guest houses. There are a number of protected areas in the region, the closest of which include the Averal Private Nature Reserve, which is located approximately 11.5km to the north-east of the site. Within protected areas, vegetation is likely to be relatively dense and more pristine than surrounding areas due to conservation management.

» **Cultivation** occurs within the natural areas and is focused around the Sand River at Waterpoort approximately 15km to the south west of the proposed site. There are also isolated areas of clearing in the vicinity of the proposed site. Cultivated areas are likely to be relatively open, providing opportunities for long distance views across the surrounding landscape.

» **Degraded areas** are evident largely on the edges of settlement. This probably stems from grazing and clearing for cultivation.

» **Industrial development** within the area is relatively sparse; however, there is a mine site (Syerfontein) in the vicinity of Mopane which is approximately 6km to the north east of the proposed site. This facility includes extensive dumps and over burden stockpiles which are likely to have a similar appearance and scale as the dumps and stockpiles that are associated with the proposed development. The site is also located adjacent to the Musina Special Economic Zone (SEZ).

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

i. Broad-Scale Vegetation Patterns

The project site is situated in the Savanna Biome. The Savanna Biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savanna Biomes are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's Savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include *Acacia and Albizia*) and a generally dense herbaceous layer.

The project site overlaps with the Musina Mopane Bushveld vegetation type (refer to **Figure 8.8**).

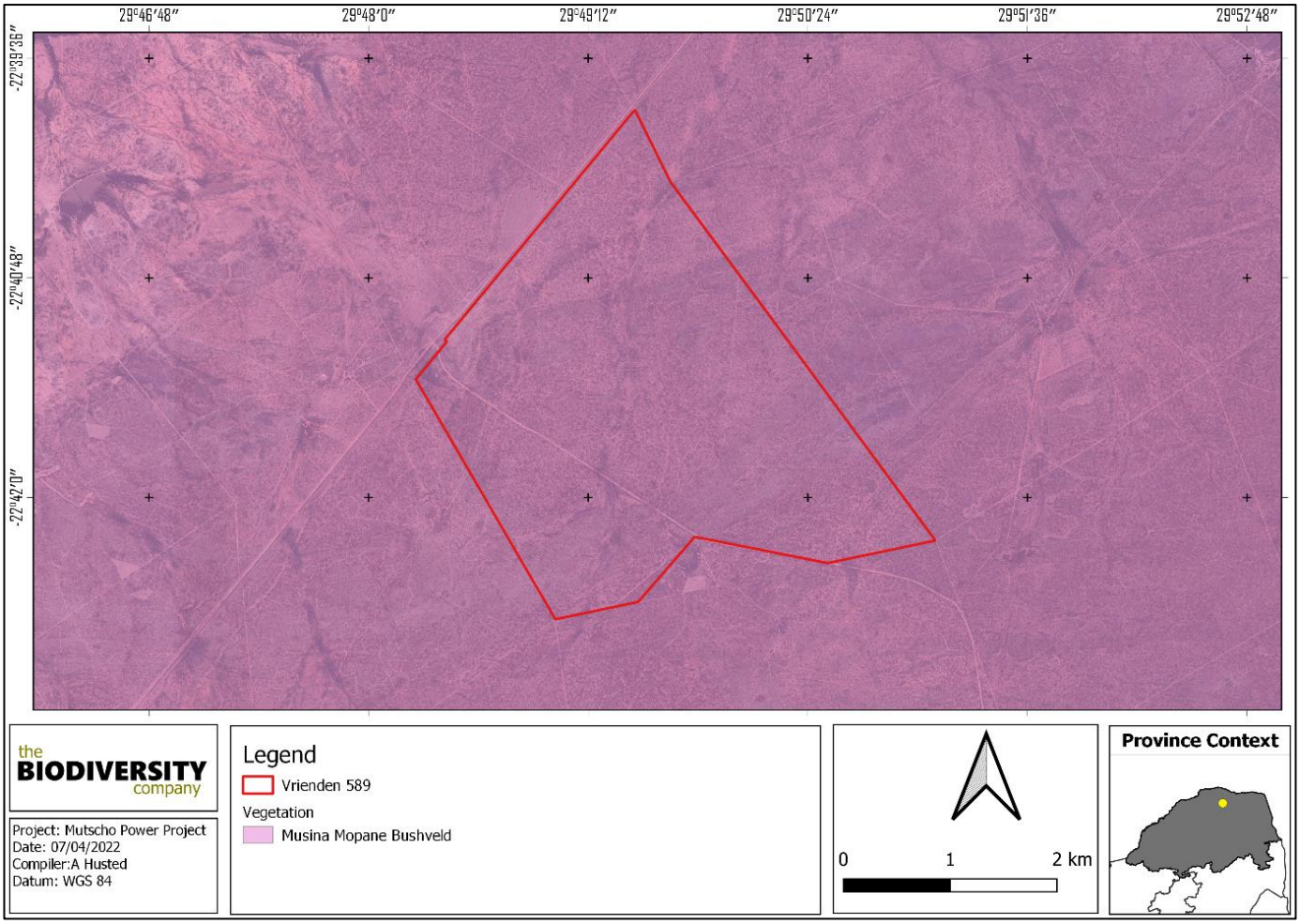


Figure 8.8: Map illustrating the vegetation type associated with the project site

Musina Mopane Bushveld

This vegetation type can be found in the Limpopo Province on undulating to very irregular plains, with some hills. In the western section, open woodland to moderately closed shrubveld dominated by *Colophospermum mopane* and *Combretum apiculatum* can be found. While in the Eastern section *Colophospermum mopane* and *Terminalia prunioides* dominates open shrubland.

Important Taxa associated with the Musina Mopane Bushveld

Tall Trees: *Senegalia nigrescens*, *Adansonia digitata*, *Sclerocarya birrea* subsp. *caffra*.

Small Trees: *Colophospermum mopane* (d), *Combretum apiculatum* (d), *Senegalia senegal* var. *leiorhachis*, *S. tortilis* subsp. *heteracantha*, *Boscia albitrunca*, *B. foetida* subsp. *rehmanniana*, *Commiphora glandulosa*, *C. tenuipetiolata*, *C. viminea*, *Sterculia rogersii*, *Terminalia prunioides*, *T. sericea*, *Ximenia americana*.

Tall Shrubs: *Grewia flava* (d), *Sesamothamnus lugardii* (d), *Commiphora pyracanthoides*, *Gardenia volkensii*, *Grewia bicolor*, *Maerua parvifolia*, *Rhigozum zambesiacum*, *Tephrosia polystachya*. Low Shrubs: *Acalypha indica*, *Aptosimum lineare*, *Barleria senensis*, *Dicoma tomentosa*, *Felicia clavipilosa* subsp. *transvaalensis*, *Gossypium herbaceum* subsp. *africanum*, *Hermannia glanduligera*, *Neuracanthus africanus*, *Pechuel-*

Loeschea leubnitziae, *Ptycholobium contortum*, *Seddera suffruticosa*. Succulent Shrub: *Hoodia currorii* subsp. *lugardii.*

Herbaceous Climber: *Momordica balsamina*. Graminoids: *Schmidtia pappophoroides* (d), *Aristida adscensionis*, *A. congesta*, *Bothriochloa insculpta*, *Brachiaria deflexa*, *Cenchrus ciliaris*, *Digitaria eriantha* subsp. *eriantha*, *Enneapogon cenchroides*, *Eragrostis lehmanniana*, *E. pallens*, *Fingerhuthia africana*, *Heteropogon contortus*, *Sporobolus nitens*, *Stipagrostis hirtigluma* subsp. *patula*, *S. uniplumis*, *Tetrapogon tenellus*, *Urochloa mosambicensis*.

Herbs: *Acrotome inflata*, *Becium filamentosum*, *Harpagophytum procumbens* subsp. *transvaalense*, *Heliotropium steudneri*, *Hermbstaedtia odorata*, *Oxygonum delagoense*. Succulent Herbs: *Stapelia gettliffei, S. kwebensis.*

Conservation Status of the Musina Mopane Bushveld

This vegetation type is classed as Least Concern, with only 3 % statutorily conserved in the Mapungubwe National Park, Nwanedi and Honnet Nature Reserves and the Baobab Tree Reserve. The conservation target is 19 %.

ii. Expected Flora Species

The Plants of southern Africa (POSA) database indicates that 292 species of indigenous plants are expected to occur within the project site (The full list of species will be provided in the EIA Phase Terrestrial Ecology Report). Two (2) species of conservation concern (SCC) based on their conservation status could be expected to occur within the project site and are provided in **Table 8.6** below.

Table 8.6: Threatened flora species that may occur within the project site

Family	Taxon	Author	IUCN	Ecology
Fabaceae	*Indigofera rehmannii*	Baker f.	EN	Indigenous; Endemic
Apocynaceae	*Ceropegia cimiciodora*	Oberm.	VU	Indigenous

iii. Critical Biodiversity Areas and Ecological Support Areas

The 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.

The Limpopo Conservation Plan (2018) aims to inform land-use planning and development on a provincial scale and to aid in natural resource management. One of the outputs is a map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These are classified into different categories, namely Protected Areas, CBA1, CBA2, ESA1, ESA2, Other Natural Areas (ONAs) and areas with No Natural Habitat Remaining (NNR) based on biodiversity characteristics, spatial configuration, and requirements for meeting targets for both biodiversity patterns and ecological processes.

Figure 8.9 shows the project site superimposed on the Terrestrial CBA map. The project site overlaps with and area classified as ESA1.

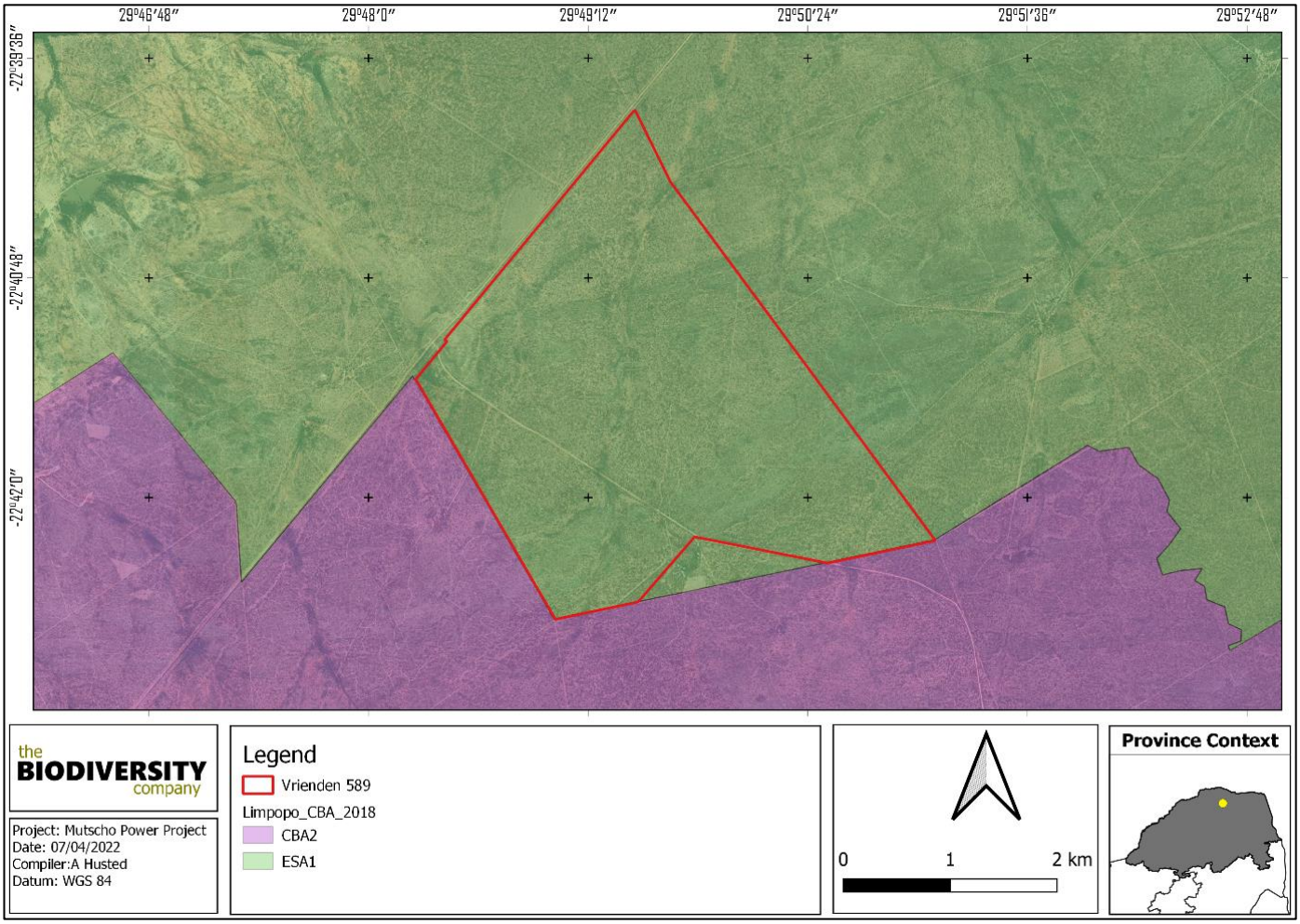


Figure 8.9: Map illustrating the project site as falling within an area classified as ESA1

iv. 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 proposed project overlaps with a LC ecosystem (refer to **Figure 8.10**).

The Ecosystem Protection Level is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed project overlaps with a MP ecosystem (refer to **Figure 8.11**)

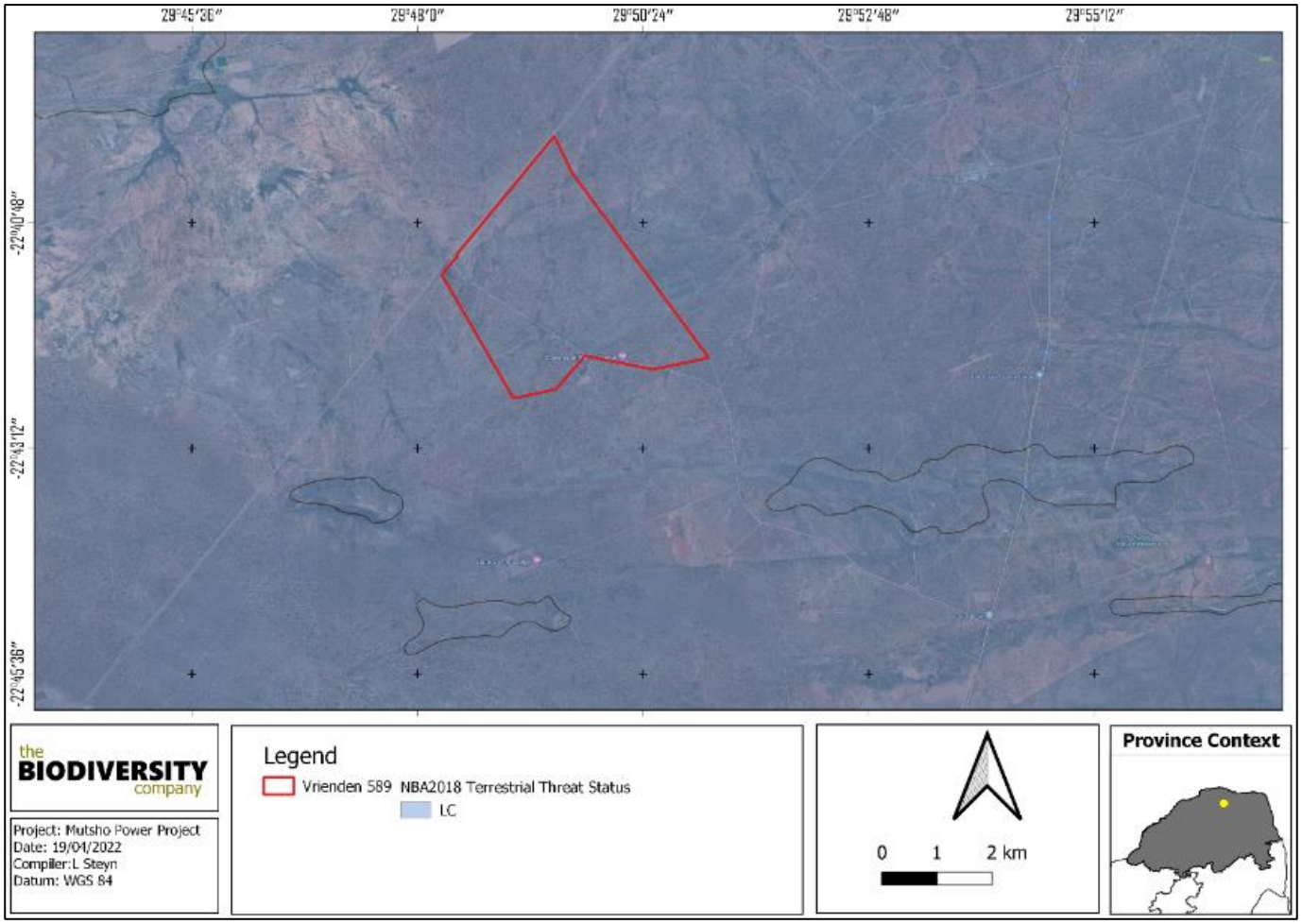


Figure 8.10: Map illustrating the ecosystem threat status associated with the project site

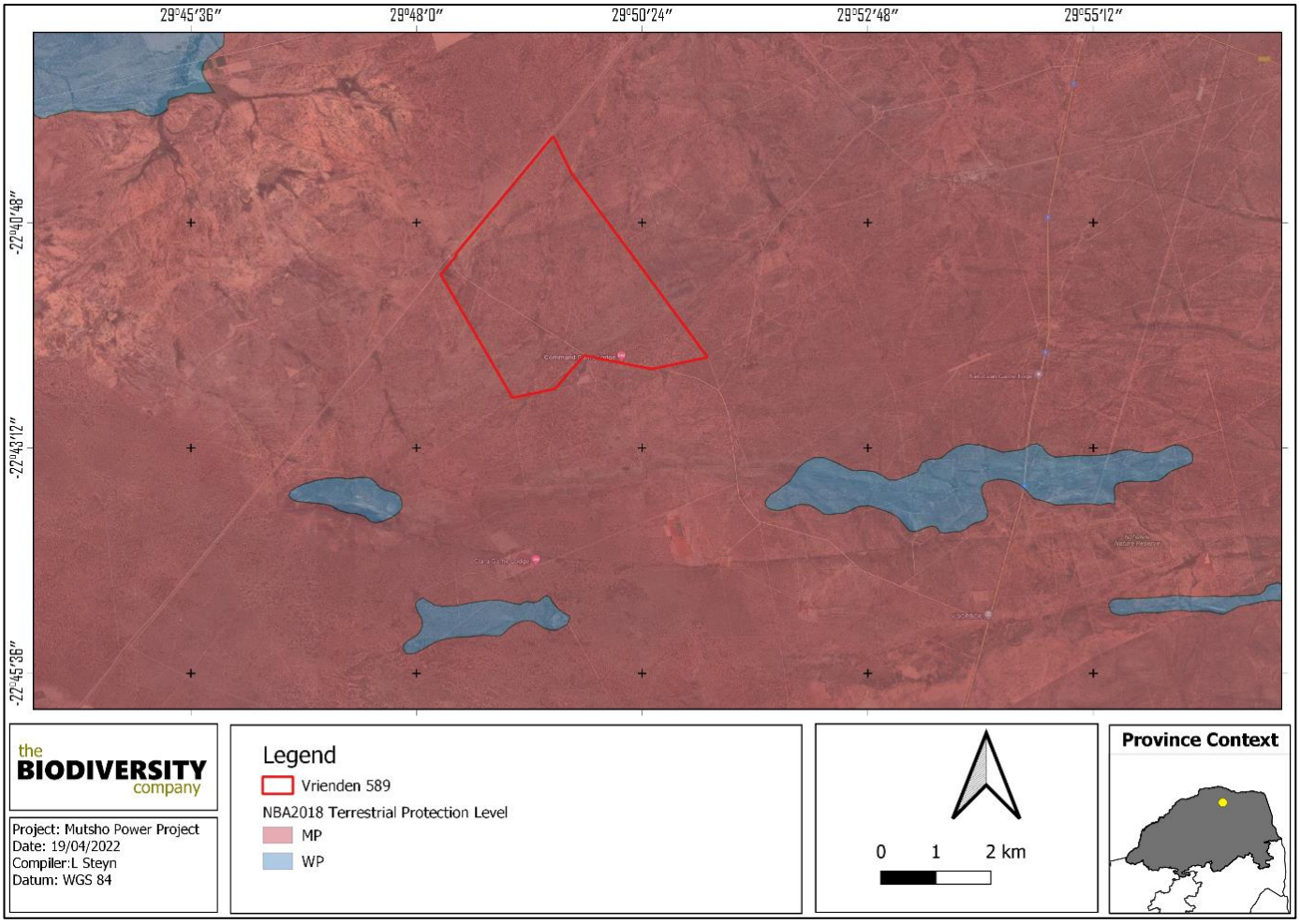


Figure 8.11: Map illustrating the ecosystem protection level associated with the project site

v. Protected Areas and National Protected Areas Expansion Strategy Focus Areas

Protected Areas

According to the protected area spatial datasets from the South African Protected Areas Database (SAPAD) (2021), the project site overlaps with the Vhembe Biosphere Reserve (refer to **Figure 8.12**). No protected areas were found withing 5km of the project site. The closest reserve is the Avarel Private Nature Reserve that is located 8.9km from the project site.

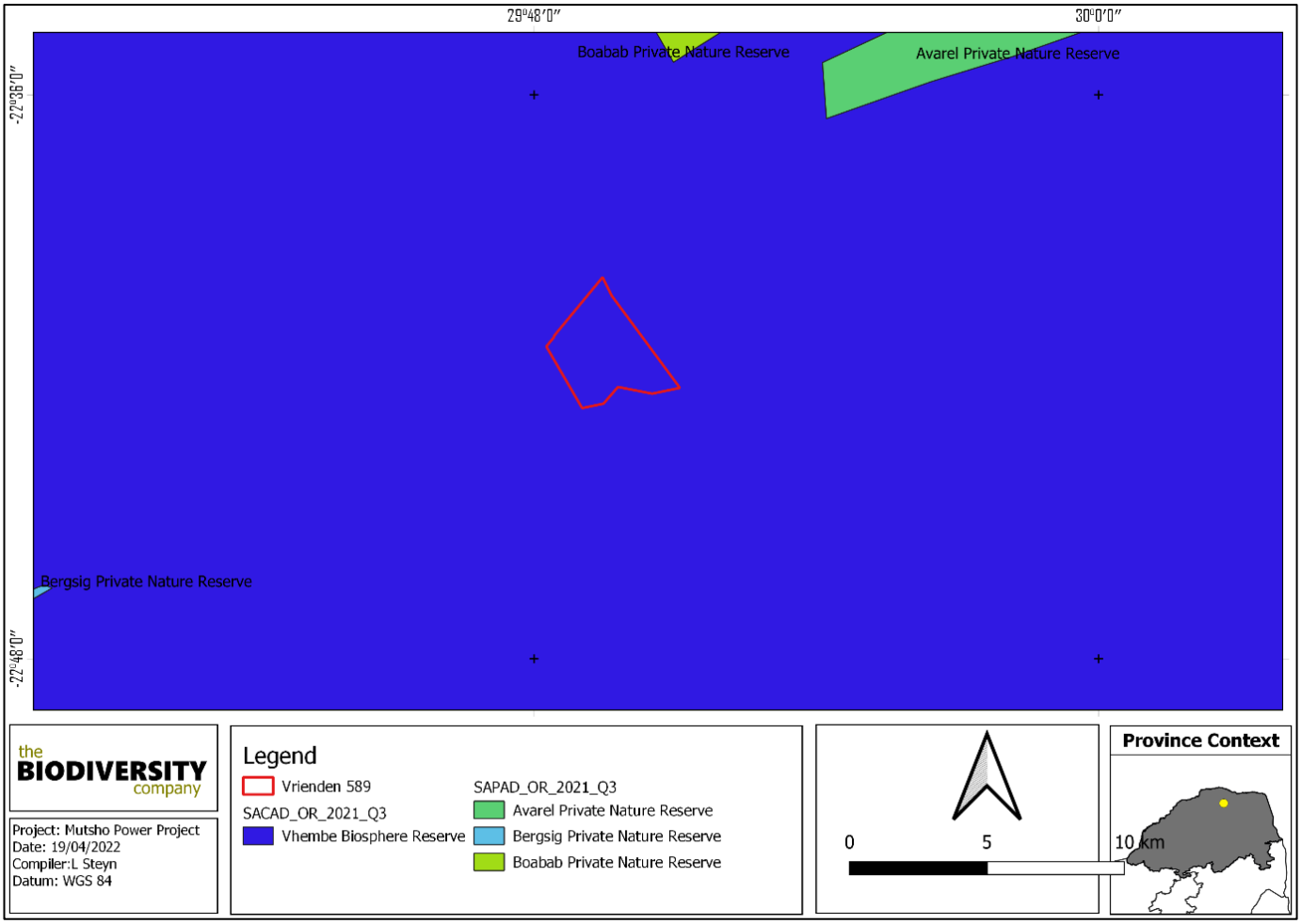


Figure 8.12: The project site in relation to protected areas

Vhembe Biosphere Reserve

In 2011, the Vhembe region was officially declared the Vhembe Biosphere Reserve (UNESCO's MAB Programme). The Vhembe Biosphere Reserve is approximately 3 038 852ha in extent and covers approximately 24% of the Limpopo Province. The Vhembe Biosphere Reserve includes the northern part of the Kruger National Park (KNP), the Mapungubwe Cultural Landscape comprising the Mapungubwe National Park and Mapungubwe Hill World Heritage site, several Provincial Nature Reserves, two (2) recognized centres of biodiversity and endemism (i.e. the Soutpansberg and Blouberg Mountain Ranges) and the Makgabeng Plateau which contains more than 1 000 rock art sites; and the Makuleke Wetlands. It is a prime destination for eco-tourism, cultural tourism and related activities such as hunting. There are a large number of Private Game Farms and agricultural farms within the Vhembe Biosphere Reserve which create the opportunity for unleashing the economic potential of the Vhembe Biosphere Reserve.

The Vhembe Biosphere Reserve is intended to promote an integrated approach to sustainable development, ensuring that essential ecosystem services are maintained; education is improved; and human development and wealth creation are stimulated through better communication and training, while conserving the unique ecosystems, species, and cultural resources, of the region. The reserve comprises three (3) biomes; namely savanna, grassland, and forest; four (4) bioregions; and twenty-three (23) vegetation types; eight (8) of which are endemic to South Africa. The area is also a bio-geographical node, comprising the Kalahari, Lowveld bioregions characterised by temperate, tropical climatic conditions. This

creates zones of ecologically important interactions, which need to be protected to ensure conservation viability.

The South African National Spatial Biodiversity Assessment (NSBA) included the Blouberg and Soutpansberg complex as 1 of its 9 priority areas for conservation action based on a combined analysis of species, ecosystems and ecological processes. This area is also listed as a hotspot of South African biodiversity and endemism (Van Wyk & Smith, 2001). Lake Fundudzi located in the Soutpansberg Mountains is Southern Africa's only natural inland lake, while several of the wetlands within the mountain range contain peat which contains information going back 12 000 years BP (before present).

National Protected Areas Expansion Strategy Focus Areas

National Protected Area Expansion Strategy (NPAES) focus areas (2016) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine-scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The project site is approximately 3.7km from a priority focus area as can be seen in **Figure 8.13**.

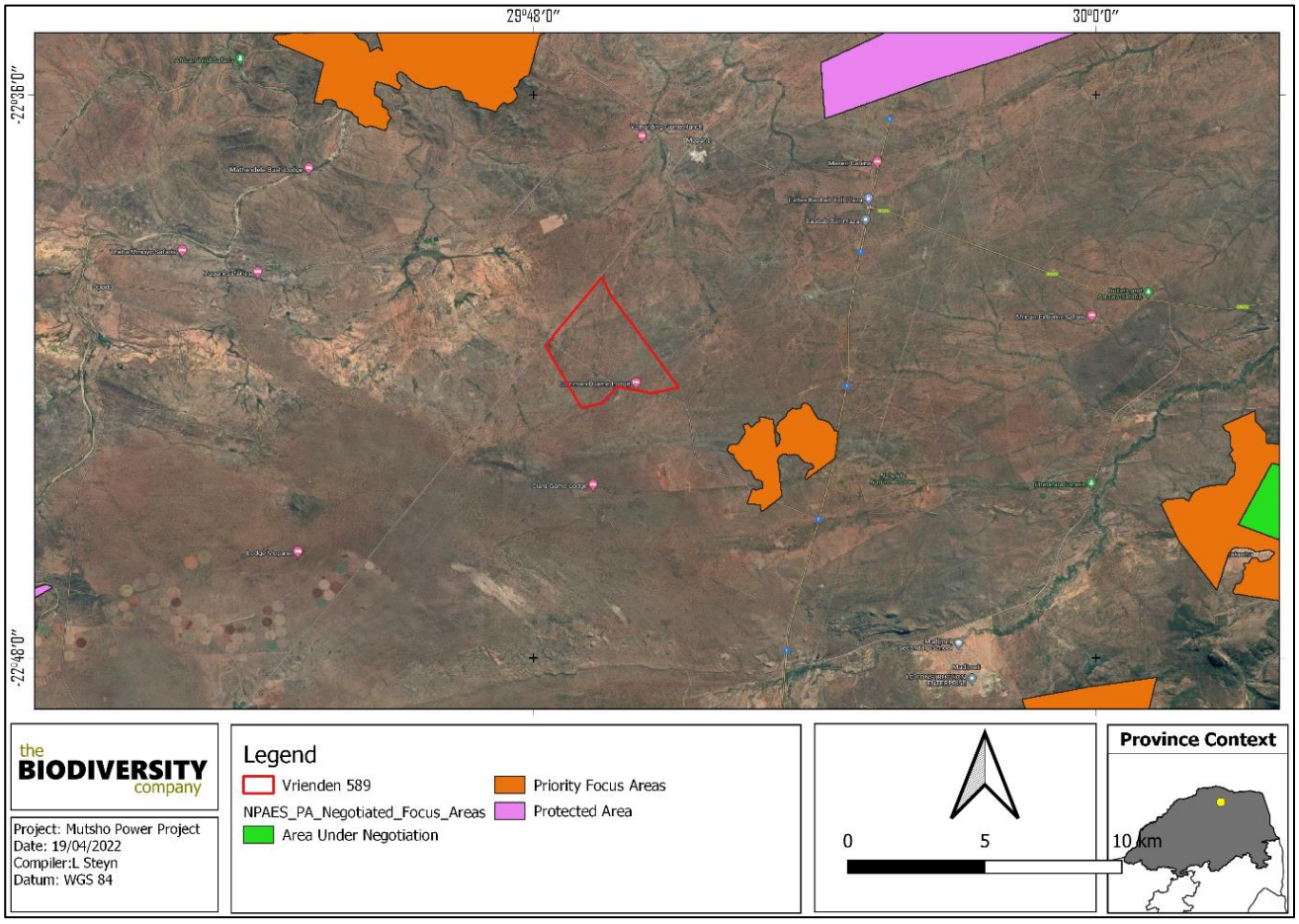


Figure 8.13: The project site in relation to National Protected Area Expansion Strategy (NPAES) focus areas

vi. Hydrological Setting

Catchment

The project site is located in the A71K quaternary catchments of the Limpopo Water Management Area as revised in the 2012 water management area boundary descriptions (government gazette No. 35517). According to the river line dataset for the Quarter Degree Square (QDS), a network of ephemeral watercourses is located within the project area, flowing in a northerly direction (refer to **Figure 8.14**). **Figure 8.15** presents the extent of ephemeral drainage lines delineated by Digby Wells (2018).

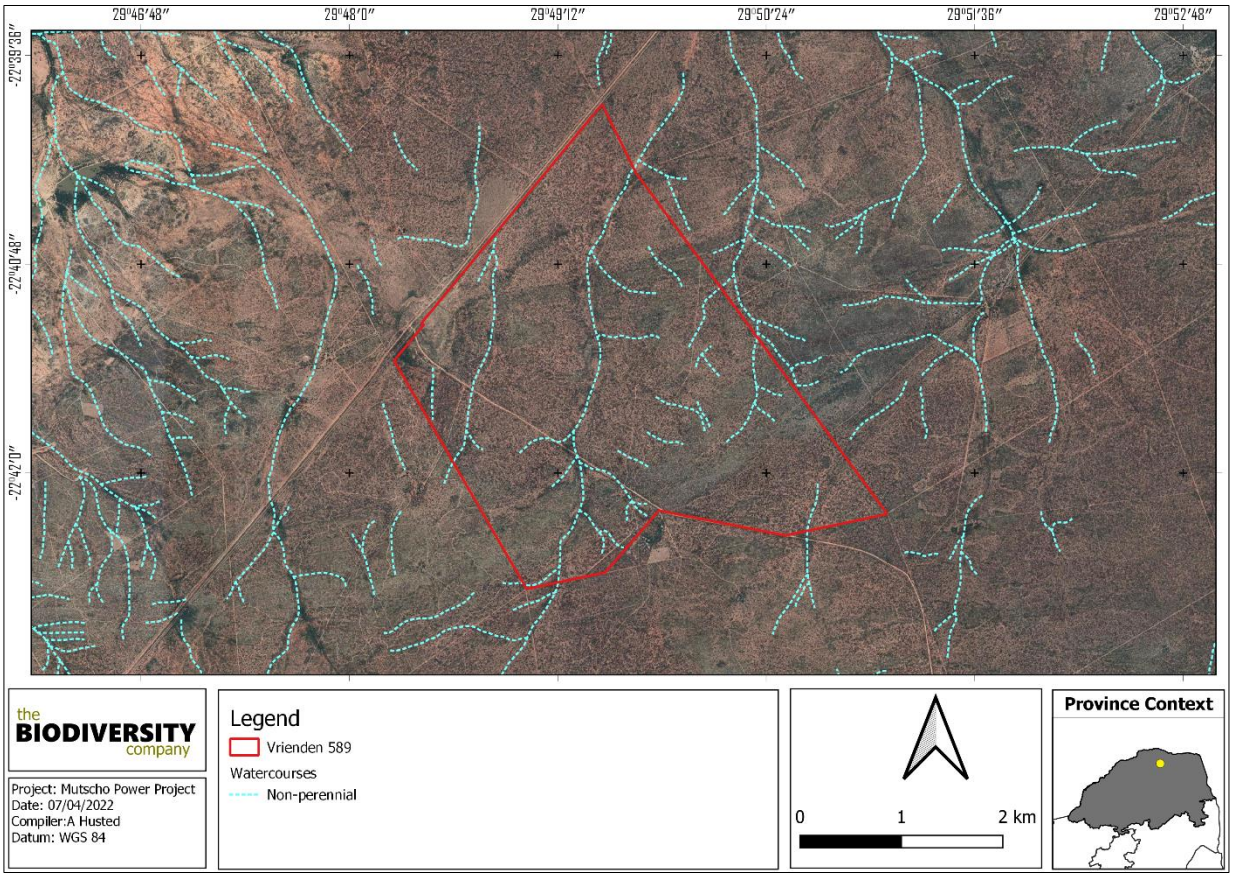


Figure 8.14: The extent of the watercourses within the project site

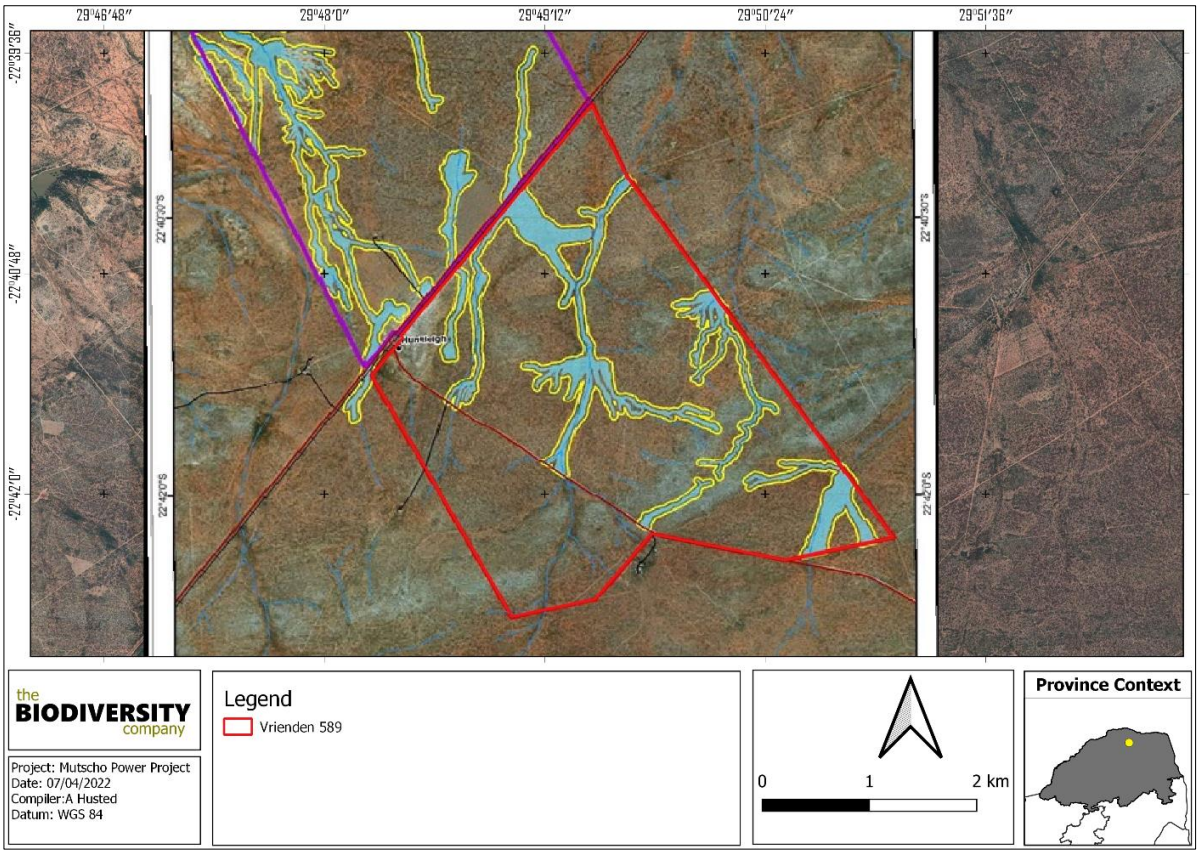


Figure 8.15: The drainage lines delineated by Digby Wells (2018)

National Freshwater Ecosystem Priority Area Status

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.,* 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals.

Figure 8.16 shows the location of the project site in relation to wetland FEPAs. Based on this information, a non-priority seepage system is located within the extent of the project site. The wetland is considered to be in a seriously modified ecological state.

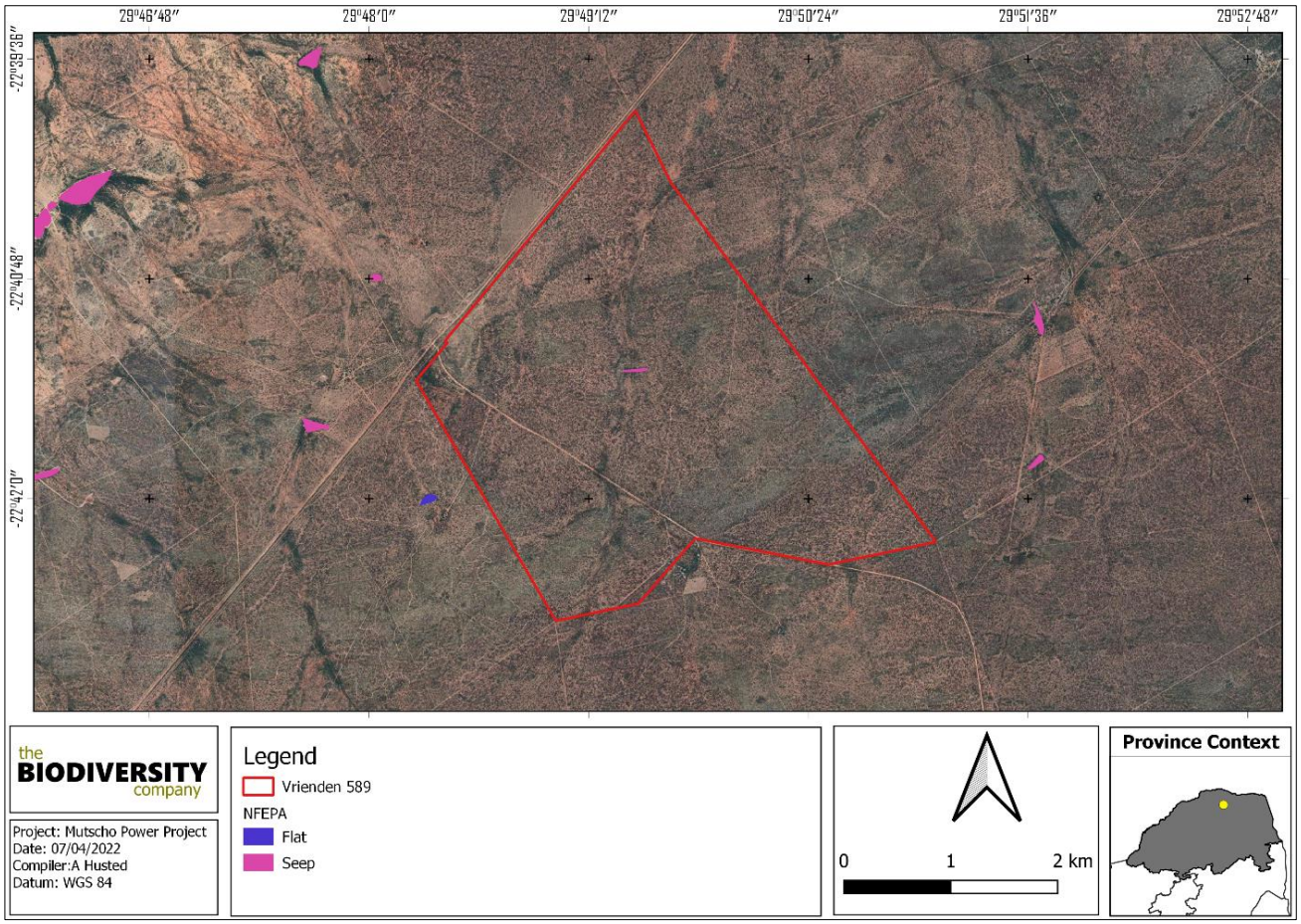


Figure 8.16: The location of NFEPA wetlands in relation to the project site

National Wetland Map 5

The National Wetland Map 5 (NWM5) spatial data was published in October 2019 in collaboration with the South African National Biodiversity Institute (SANBI), with the specific aim of spatially representing the location, type and extent of wetlands in South Africa. The data represents a synthesis of a wide number of official watercourse data, including rivers, inland wetlands and estuaries. This database does not recognise the presence of systems within the project site.

Ecosystem Threat Status of Rivers and Wetland Ecosystems in the Project Site

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened'. The project site is located 11km away from the closest NBA river and 7.6 km away from the closest wetland (refer to **Figure 8.17**).

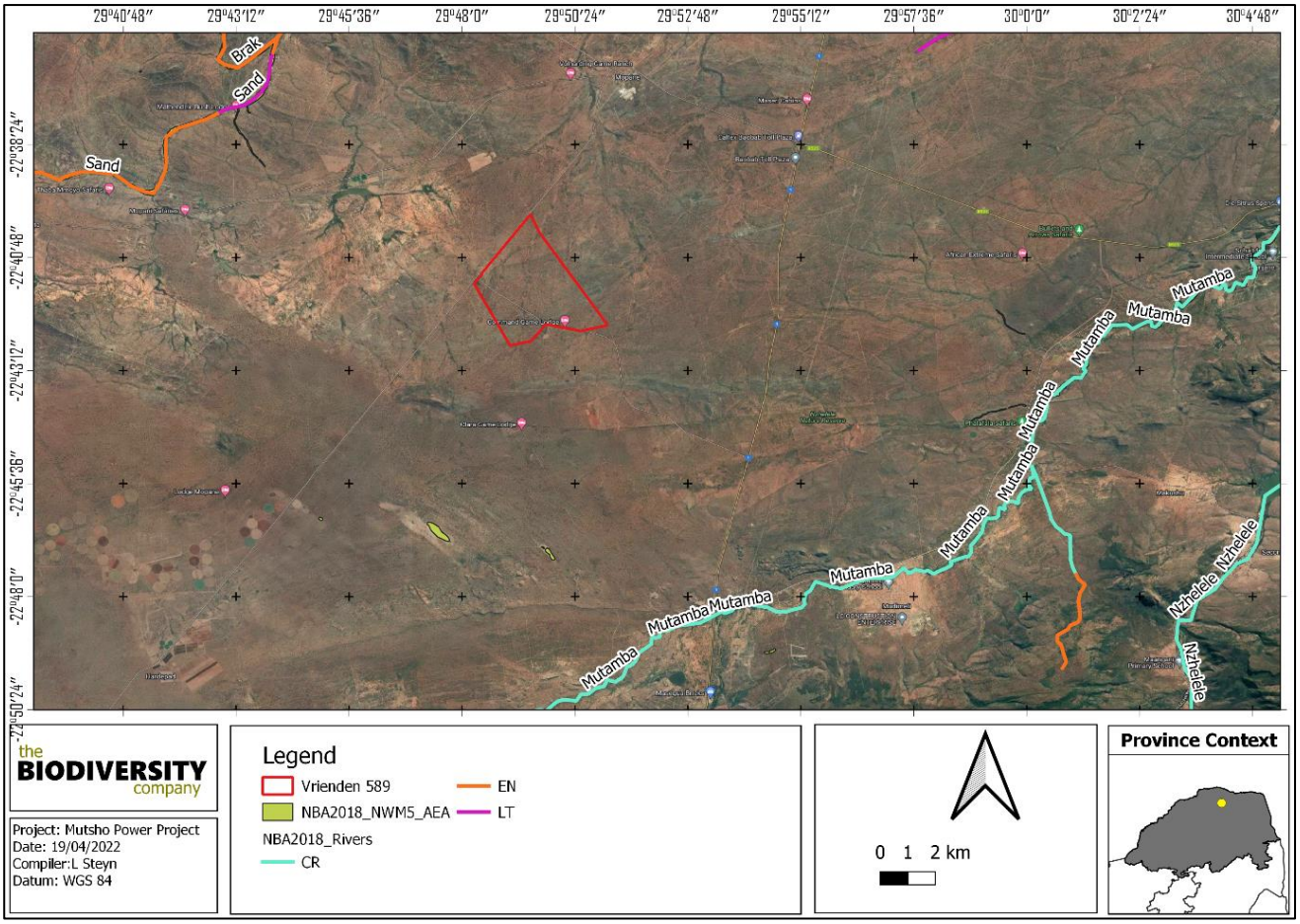


Figure 8.17: Map illustrating ecosystem threat status of rivers and wetland ecosystems in the project site and study area

vii. Terrestrial Fauna Communities

Mammals

The International Union for Conservation of Nature (IUCN) Red List Spatial Data lists one hundred and seven (107) mammal species that could be expected to occur within the area. This list excludes large mammal species that are normally restricted to protected areas. Sixteen (16) of these expected species are regarded as threatened (refer to **Table 8.7**), twelve of these have a low likelihood of occurrence based on the lack of suitable habitat and food sources within the project site.

Table 8.7: Threatened mammal species expected to occur within the project site

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Atelerix frontalis	South Africa Hedgehog	NT	LC	Moderate
Cloeotis percivali	Short-eared Trident Bat	EN	LC	Low
Crocidura maquassiensis	Makwassie musk shrew	VU	LC	Low
Crocidura mariquensis	Swamp Musk Shrew	NT	LC	Low
Crocuta crocuta	Spotted Hyaena	NT	LC	Low
Dasymys incomtus	African Marsh rat	NT	LC	Low

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Low
Felis nigripes	Black-footed Cat	VU	VU	Moderate
Leptailurus serval	Serval	NT	LC	Moderate
Nycteris woodi	Wood's Slit Faced Bat	NT	LC	High
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Low
Redunca fulvorufula	Mountain Reedbuck	EN	EN	Low
Smutsia temminckii	Temminck's Ground Pangolin	VU	VU	Low

Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, thirty-five (35) amphibian species are expected to occur within the area. Two (2) are regarded as threatened (refer to **Table 8.8**).

Table 8.8: Threatened amphibian species expected to occur within the project site

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Breviceps sylvestris	Northern Forest Rain Frog	VU	VU	Low
Pyxicephalus adspersus	Giant Bullfrog	NT	LC	Moderate

Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, one hundred and thirty-four (134) reptile species are expected to occur within the project site (The full list will be provided in the Terrestrial Ecology Impact Assessment to be submitted as part of the EIA Report). Seven (7) are regarded as threatened (refer to **Table 8.9**).

Table 8.9: Threatened reptile species expected to occur within the project site

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Chamaesaura macrolepis	Large-scaled Grass Lizard	NT	LC	Low
Chirindia langi occidentalis	Soutpansberg Worm Lizard	VU	Unlisted	Moderate
Crocodylus niloticus	Nile Crocodile	VU	LC	Low
Homopholis mulleri	Muller's Velvet Gecko	VU	LC	Moderate
Lygodactylus ocellatus soutsbergensis	Soutpansberg Dwarf Gecko	NT	LC	Low
Scelotes limpopoensis albiventris	White-bellied Dwarf Burrowing Skink	NT	Unlisted	Low

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Vhembelacerta rupicola	Soutpansberg Rock Lizard	NT	LC	Low

viii. Avifauna

Important Bird and Biodiversity Areas

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife, 2017).

According to Birdlife International (2017), the selection of IBAs are achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental, and global levels. **Figure 8.18** shows that the project site is 12km from the Soutpansberg IBA.

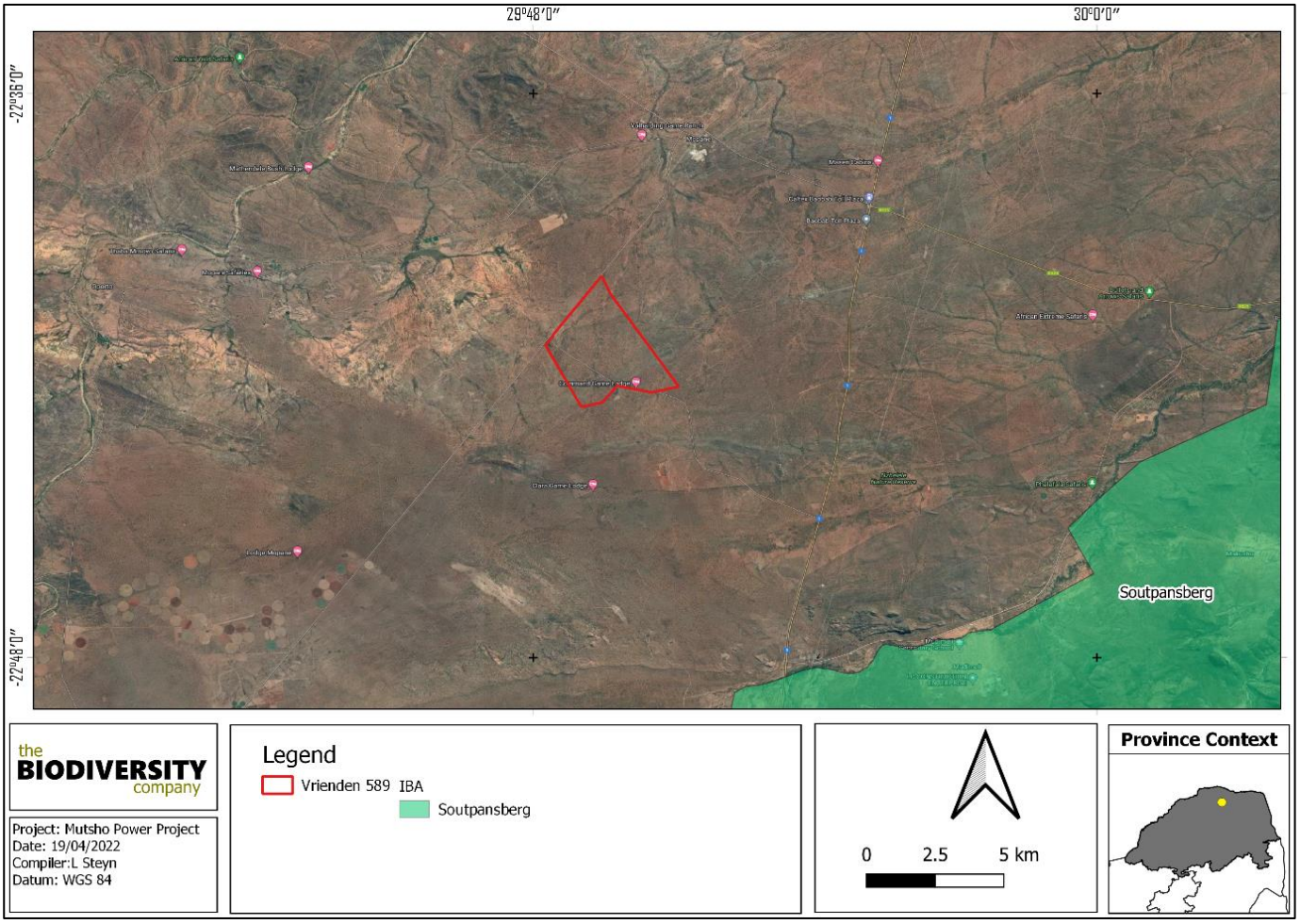


Figure 8.18: The project site in relation to the Soutpansberg IBA

Avifauna Species Expected to Occur within the area

The Southern African Bird Atlas Project 2 (SABAP2) Data lists two hundred and thirty-seven (237) avifauna species that could be expected to occur within the area (The full list will be provided in the Terrestrial Ecology Impact Assessment to be submitted as part of the EIA Report). Eleven (11) of these expected species are regarded as threatened (refer to **Table 8.10**). Six (6) of the species have a low likelihood of occurrence due to lack of suitable habitat and food sources within the project site.

Table 8.10: Threatened avifauna species expected to occur within the project site

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Aquila rapax	Eagle, Tawny	EN	VU	Moderate
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Low
Ardeotis kori	Bustard, Kori	NT	NT	Low
Bucorvus leadbeateri	Ground-hornbill, Southern	EN	VU	Low
Ciconia nigra	Stork, Black	VU	LC	Low
Coracias garrulus	Roller, European	NT	LC	High
Ephippiorhynchus senegalensis	Stork, Saddle-billed	EN	LC	Low
Gyps africanus	Vulture, White-backed	CR	CR	High
Polemaetus bellicosus	Eagle, Martial	EN	EN	High
Terathopius ecaudatus	Bateleur, Bateleur	EN	EN	Low
Torgos tracheliotos	Vulture, Lappet-faced	EN	EN	Moderate

8.5. Integrated Heritage, including Archaeology, Palaeontology and Cultural Landscape

8.5.1. Cultural Landscape and the Built Environment

According to Silidi and Pikirayi (2013), "The coming of the Voortrekkers in the area and the introduction of commercial farming in the 19th and early 20th centuries has a strong archaeological footprint in the Mopane area. We noted a prevalence of house remains associated with pioneer commercial farmers and shifting semi-permanent dwellings of farm workers. Several graves both with inscriptions and "anonymous" mostly associated with pioneer farmers or their workers were also recorded."

Broadly, the project site, which is approximately 70km from Mapungubwe, may be considered as part of the Greater Mapungubwe Cultural Landscape. Mapungubwe was once (between 900 and 1300 CE) the centre of gold and ivory trade with eastern African ports. It was South Africa's first kingdom, and developed into the subcontinent's largest realm, lasting for 400 years before it was abandoned in the 14th century. Its highly sophisticated people traded gold and ivory with China, India and Egypt. While the broader area of northern Limpopo can be considered to be part of the Greater Mapungubwe Cultural Landscape, the context of the area under assessment has been negatively impacted by the significant number of coal mines in the area. Furthermore, the proposed PV facilities are located sufficiently far from the N1 (8km) that no impact to the way that this area is experienced is expected.

8.5.2. Living Heritage

In the Heritage Impact Assessment completed on the Remaining Extent of Farm Vrienden 589 in 2016, a unique example of living heritage was identified. The Baobab Room, Site V04, continues to be used today.

The baobab, which has an entirely hollow trunk at ground level, has a number of windows that allow light into the shelter provided within the trunk. Pegs have been hammered into the external bark to facilitate access to inside the tree through one of these windows. There appears to be a deposit of unknown depth inside the trunk. For its unique value, this site has been graded IIIA (SAHRIS ID 105147). This site falls well outside of the area proposed for the PV facilities and no impact is anticipated.

8.5.3. Archaeology

South Africa has an extensive stone age archaeological record including the Earlier Stone Age (approximately 2.5mya to 200 kya), Middle Stone Age (200 kya to 40 kya) and Later Stone Age (40 kya to 2000 years ago) deposits. These sites tend to present scatters of stone age artefacts. Rarely, archaeologists may find a stone tool manufacture site with evidence of stone flake tools as well as the flaked pieces of stone. Later Iron Age sites, such as Mapungubwe, tend to present the remnants of Iron Age settlements identified through distinct patterns of stone features that formed the foundations of iron age structures. Often, Early Iron Age sites are not visible on the surface but are evidenced by material culture associated with the Early Iron Age such as pottery sherds, Iron slag and other material culture located beneath the land surface.

The area surrounding the farm proposed for this development is known for a variety of kinds of heritage resources, including Stone Age and Iron Age archaeology, significant structures and living heritage sites such as significant baobab trees as well as burial grounds and graves. There are numerous informal burial grounds and graves located in this area, associated with farm workers or mine workers. Often these burial grounds are not fenced and have minimal surface markings denoting their presence. These informal burial grounds and graves have a significant role to play in terms of the cultural continuity of residents of the area. Previous surveys of this area (Silidi and Pikirayi, 2013 and CTS Heritage, 2016 and 2018) identified several heritage resources across this farm (refer to **Figure 8.19**). The heritage sites are listed and described in **Table 8.11.**

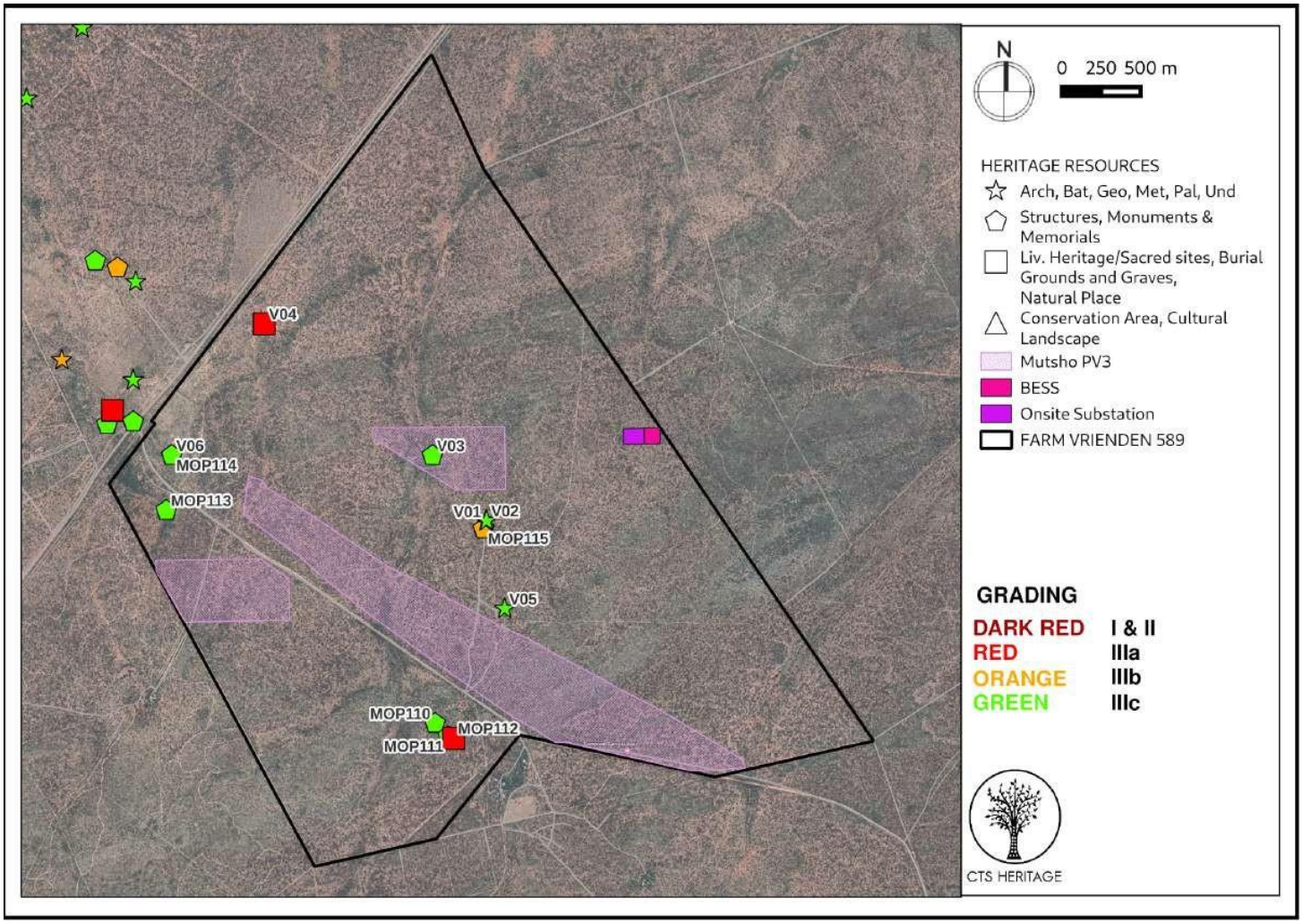


Figure 8.19: All significant heritage resources within proximity to the development area.

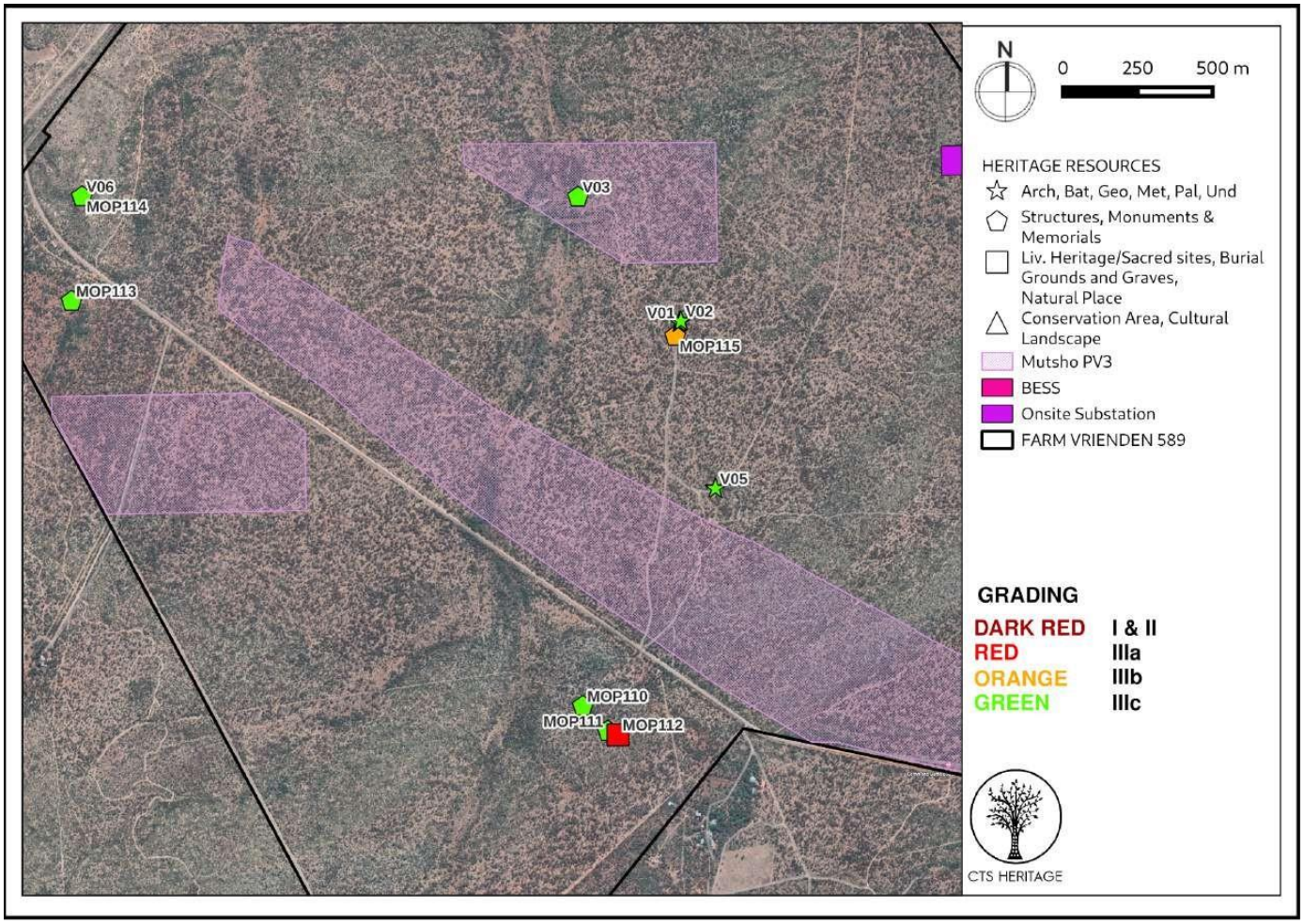


Figure 8.20: Map of heritage resources identified near the PV development area.

Table 8.11: Heritage sites previously identified within the project site

Site ID	Site no	Full Site Name	Site Type	Description	Grading	Mitigation
37464	MOP035	Mopane 035	Deposit	Next to medium size Mopane trees, there are makeshift fire places for curing of Mopane worms. Ash deposit is evidence of seasonal use.	Grade IIIc	50m buffer
37563	MOP110	Mopane 110	Structures, Deposit	An open flat area with mixed vegetation including Mopane and hooked thorn. Square house foundation of calcite stones. An ash midden to the north of the site. It was reported that the Ramufhi family (farm workers) stayed there. They had moved away from farm more than 12 years ago.	Grade IIIc	50m buffer
37564	MOP111	Mopane 111	Structures	Open flat area with mixed vegetation. Remains of stone buildings with mound suggesting earth plaster. Possibly associated with farm workers.	Grade IIIc	50m buffer
37566	MOP113	Mopane 113	Structures	Open flat area of mixed vegetation including Mopane. Extensive evidence of farm occupation. Circular stone cairn 1m high x 2.5m diameter, cement floor, concrete blocks and cement bricks and plaster remains.	Grade IIIc	50m buffer
37567	MOP114	Mopane 114	Structures	On the crest of a ridge with a view of the surround country. Mixed scrub vegetation including Mopane. School building for whites only. Partially collapsed square building, stones and cement plaster used. 4 rooms and a veranda facing E. Several cairns around the building and square brick structure on stone foundation.	Grade IIIa	100m no-go buffer
37568	MOP115	Mopane 115	Structures	Modern gabled building situated in an open flat area. Baobab and garden trees/shrubs.	Grade IIIb	100m no-go buffer
37455	MOP031	Mopane 031	Artefacts	Open site is mixed vegetation.	Grade IIIb	50m buffer
37456	MOP032	Mopane 032	Structures	Fallen windmill, water tank and derelict dip tank.	Grade IIIc	N/A
37459	MOP034	Mopane 034	Building	An open site, flat, on the side of the road and railway line. The remains of a brick building of which some walls are standing. The informant and elder brother born there in 1914 and 1937 respectively. The settlement thus dates back to before 1914.	Grade IIIa	100m no-go buffer
37466	MOP036	Mopane 036	Structures	Foundation remains of a square building, open site, aloes.	Grade IIIc	50m buffer
37468	MOP037	Mopane 037	Building	Flat area several building of which the main house is a gabled building of face brick with a closed veranda facing west. Garden trees, plants and fruit trees. Young baobab. May date to the 1960s	Grade IIIb	100m no-go buffer
37565	MOP112	Mopane 112	Burial Grounds & Graves	Open flat area with mixed vegetation. Rectangular stone settings, possibly 3 graves.	Grade IIIa	100m no-go buffer
37458	MOP033	Mopane 033	Burial Grounds & Graves	Open area with mixed vegetation. Two graves enclosed by mesh wire. 2 graves Michael van der Walt B. 24 Mar 1922, D. 27 Feb 1941; Louis van der Walt B. 15 Jan	Grade IIIa	100m no-go buffer

Site ID	Site no	Full Site Name	Site Type	Description	Grading	Mitigation
				1935, D. 22 Dec 1940. The homestead was abandoned in 1963. Dressed graves with polished headstones.		
105144	V01	Vrienden 1	Artefacts	Archaeological, 1 stone artefact	NCW	N/A
105145	V02	Vrienden 2	Artefacts	Archaeological, 1 stone artefact	NCW	N/A
105146	V03	Vrienden 3	Structures	Modern disused agricultural infrastructure	NCW	N/A
105147	V04	Vrienden 4	Living Heritage	Living Heritage/Sacred sites, the "Baobab Room"	Grade IIIa	200m no-go buffer
105149	V05	Vrienden 5	Artefacts	Archaeological, 1 stone artefact	NCW	N/A
105150	V06	Vrienden 6	Structures	Ruin of agricultural infrastructure	NCW	N/A

8.5.4. Palaeontology

The project site lies within a region of variable geology that includes sediments of the:
» Undifferentiated Karoo Basin; Tshipise and Tuli Sedimentary Basin and Solitude Formation.
» the Malala drift Gneiss and Gumbu Group of the Beit Bridge Complex, Archaean Granite-Gneiss Basement.

According to the SAHRIS Palaeosensitivity Map (refer to **Figure 8.20**), the area proposed for development is located on sediments of moderate and zero palaeontological sensitivity. An area of very highly sensitive geology is identified to the north of the development area, however no impact to these palaeontologically sensitive deposits is anticipated based on the layout provided.

Fossil heritage could be present in the UndiLerentiated Karoo as well as the Solitude Formation which has a high to very high Palaeontological Sensitivity. The Archaean Granite-Gneiss Basement, Beit Bridge Complex and Malala Drift Suite, Gumbu Group are metamorphic rocks which are unfossiliferous and with a very low palaeontological sensitivity. The north eastern part of the farm Vrienden 589 falls in the potentially fossiliferous UndiLerentiated Karoo and the unfossiliferous Archaean Granite-Gneiss Basement, Beit Bridge Complex and Malala Drift Suite, Gumbu Group. According to the Palaeontological Impact Assessment completed in 2016, (Butler), the high sensitivity deposits include sandstones, siltstones and mudstones of the Karoo Supergroup, and Bosbokpoort, Fripp, Solitude, Klopperfontein, Madzaringwe and Mikambeni Formations. These various deposits are mostly fluvial, and are known to contain a wide variety of fossils including dinosaur remains, fossil plants and petrified wood. The low sensitivity deposits comprise gneisses, representing the Malala Drift Gneiss Suite, and metamorphic rocks of the Archean Gumbu Group, which are unfossiliferous, as well as red sandstones of an indeterminate origin. The palaeontological field assessment completed by Butler (2016) identified no significant palaeontological resources within the development footprint. Butler (2016) goes on to conclude that "a low palaeontological sensitivity is allocated to the development footprint."

Based on the results of Butler (2016) and the known palaeontological sensitivity of the underlying geology of the area, it is unlikely that the proposed development will negatively impact on significant palaeontological heritage.

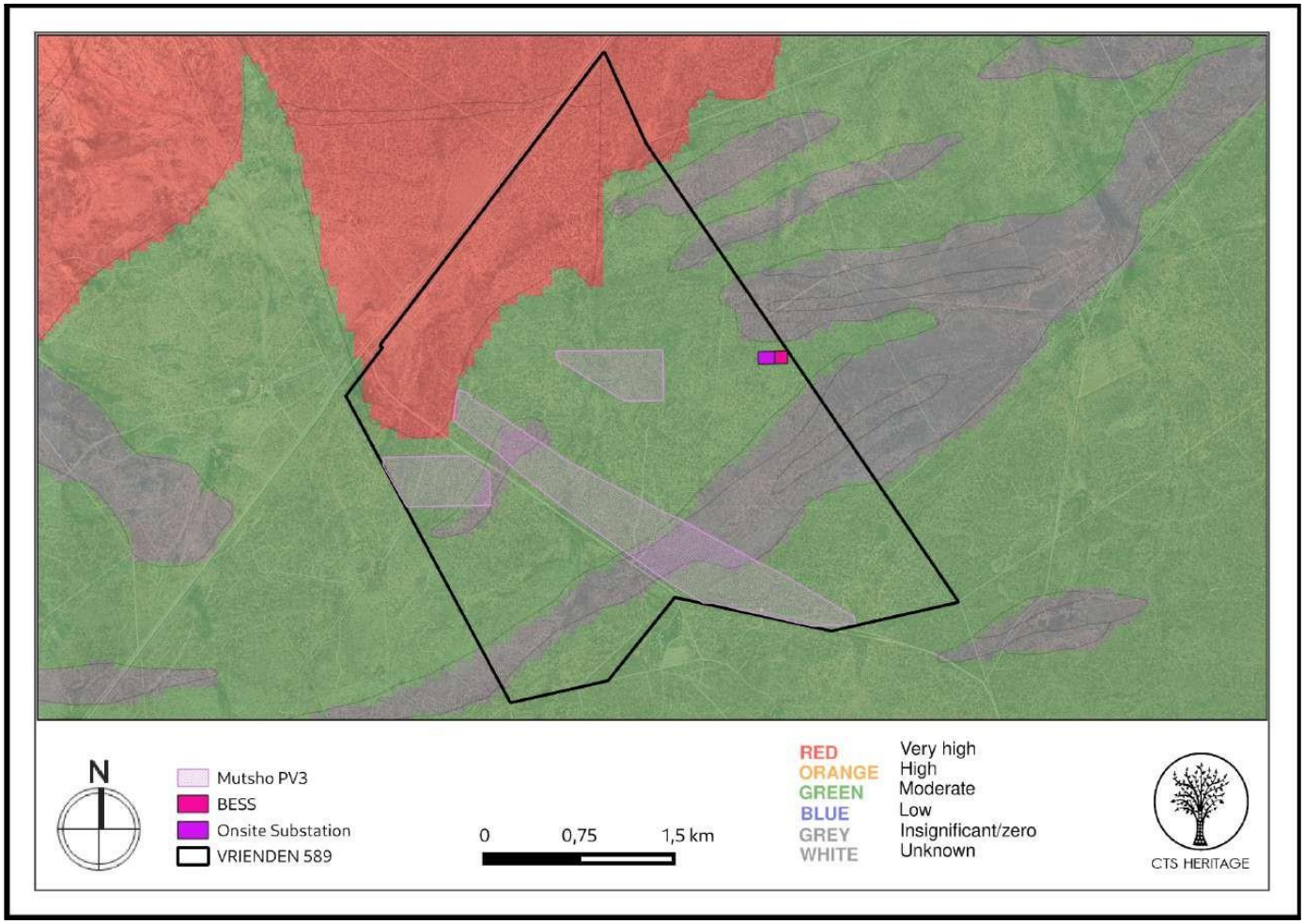


Figure 8.20: Palaeosensitivity map indicating fossil sensitivity of the proposed development area

8.6 Visual Quality

The landscape of the project site and broader area is characterised by three landscape character areas, namely, undulating plains landscape character area, Soutpansberg landscape character area, and Limpopo valley ridgelines landscape character area.

The undulating plains landscape character area comprises undulating plains to the north of the Soutpansberg and south of the Limpopo River. It is largely covered with semi-natural bushveld. The landscape character area is generally used for low intensity grazing. There also appears to be a significant eco-tourism secondary bias to the land use.

The Soutpansberg landscape character area comprises Soutpansberg mountain range to the south and east of the proposed site. The mountain slopes are vegetated but much of the valley floors are developed. The Limpopo valley ridgelines landscape character area comprises narrow ridgelines and koppies that run through the plain to the north and south of the proposed site. The ridgelines are generally covered with natural bushveld.

8.6.1 Identified Visual Receptors

This section is intended to highlight possible receptors within the landscape which due to use could be sensitive to landscape change.

» Area receptors may include (refer to **Figure 8.21**):
  * Settlement Areas, particularly Mopane which is the closest settlement to the proposed development.
  * A number of Protected Areas to the north and east of the proposed site. The closest include the Averal Private Nature Reserve.

Figure 8.21: Area receptors within the project site and broader area

» Linear receptors may include (refer to **Figure 8.22**):
  * The N1 which is the main regional arterial route that carries traffic from the Zimbabwe border crossing at Beitbridge and Gauteng. At its closest the N1 runs approximately 6km from the proposed site.
  * Regional roads including the R525, the R572, the R508 and the R523. The closest regional road is the R525 which at its closest is approximately 10km from the proposed site.
  * Local Roads that are largely un-surfaced. A number of local roads run in close proximity to the proposed site area, including one that runs immediately to the north and west of the site adjacent to a railway line and one that runs through the southern section of the Remaining Extent of Farm Vrienden linking directly to the N1.
  * In addition to roads, there is a railway line that runs to the north and west of the site. This section of the railway is likely to be largely carrying freight between Zimbabwe and South Africa. Passenger services in South Africa currently terminate at Messina and commence on the Zimbabwe side of the border at Beitbridge so it is likely to carry passengers. Research indicates that no major tourist trains such as the Blue Train use this route. The importance of the railway as a receptor is therefore likely to be relatively low.

Figure 8.22: Linear receptors within the project site and broader area

» Point receptors may include (refer to **Figure 8.23**):

- Individual buildings that are likely to be mainly rural homesteads and farms. It is likely that a proportion of these include tourist lodges and accommodation.
- Small groups of dwellings that are likely to include small settlement areas and larger farm establishments which may also include tourist bush camps.
- Game Lodges, including:
    - The Command Game Lodge which is located adjacent to the southern boundary of the property; and
    - The Bujstaan Game Lodge that is located approximately 6.6km due east of the property.

Figure 8.23: Point receptors within the project site and broader area

8.7 Socio-Economic Profile

8.7.1 Profile of the Broader Area

The project site is located within Ward 2 of the Musina Local Municipality, which forms part of the Vhembe District Municipality.

Population, Income and Employment Profile

The Musina Local Municipality falls within the Vhembe District Municipality. Musina Local Municipality accounts for 24% of the population and of the households in the district.

Population growth between 2010 and 2020 was 3% year-on-year for the local municipality which compared favourably to the district municipality (1.1%) and Limpopo (0.9%) over the same period. The high population growth in Musina indicates that the municipality offers several opportunities, attracting people towards the area. This can also be motivated by the higher average monthly household income, which is the highest (R5 450.00).

Table 8.12: Overview of the primary study areas population structure (Source: Quantec Standardised Regional (2022); Stats SA (2011) forecast to 2022))

Indicator	Limpopo	Vhembe District Municipality	Musina Local Municipality
Area (km^2)	125 753	25 596	7 576
Population	5 953 748	1 458 007	79 224
Number of Households	1 555 907	375 966	23 401
Population density (km^2)	47	56	10
Average household size	3,8	3,8	3,3
Annual population growth (2010-2020)	0,9%	1,1%	3,0%
Average monthly household income	**R4 713**	**R3 887**	**R5 450**

The average household income for the Vhembe District Municipality in 2022 is estimated to be R3 887.00. The proposed project will also attract additional population to the study area as several employment opportunities will be created through the development, this will ensure a sustainable population growth.

Table 8.13: Employment profile of the study areas (Source: Quantec Standardised Regional (2022))

Indicator	Limpopo	Vhembe District Municipality	Musina Local Municipality
Employed	1 028 379	225 033	28 374
Unemployment Rate	35,9%	37,1%	20,2%
Not Economically Active	1 907 905	501 670	18 209
Labour force participation rate	29,3%	26,2%	52,8%

Table 8.13 indicates the number of people employed and not economically active, the percentage of the population unemployed as well as the labour force participation rate for areas in review. The relatively lower unemployment rate and higher labour force participation relative to the district averages further suggests

that the local municipality is subject to inward migration due to the employment opportunities available within the local municipality.

Economic Profile

The following subsection outlines the economic profile at a national as well as a provincial, district municipal and local municipal level.

Nationally, South Africa's Gross Domestic Product (GDP) recorded its fourth consecutive quarter growth, expanding with 1.2% in the second quarter of 2021 (April-June), this followed the increase of 1% in the first quarter (January-March). However, despite the gains made over the last four quarters, the economy is 1.4% smaller than what it was before the COVID-19 pandemic (StatsSA, 2021).

The GVA (Gross Value Added) of the Musina Local Municipality was R9.8 million in 2020 (constant prices), which collectively accounts for just over 12% of the district economy's GVA, and 1.8% of Limpopo's GVA. The proposed project will contribute further to the economy and ensure sustainability.

The growth of the local municipality over the last few years was largely due to the strong performance of the agriculture, trade, and finance business services sectors. Mining and quarrying indicated a contraction in the last 10-years in the district and local municipalities. However, it remains a large contributor in the economy. Electricity is a small sized industry in the municipality. Any new development would likely greatly increase the contribution of the utilities and construction sectors to the GVA.

Over the last ten years, the Compound Average Growth Rate (CAGR) of Musina Local Municipality increased with 2.87%. The sectors responsible for the increase of the overall GVA a growth over the 10-year period in Musina Local Municipality are agriculture and trade. The mining, construction and transport sectors indicated a contraction. The utilities sector indicates a growth of 0.68%. The proposed project will further increase this sector's performance.

The agriculture sector employs the most with a 38.92% contribution in 2020 in the Musina Local Municipality. The utilities sector employs the least in the municipality. The proposed project will increase the number of employees in this sector. The local agricultural sector includes limited subsistence (informal) farming, unlike other areas in Limpopo, where this practice is more dominant.

8.7.2 Profile of the Immediate Affected Area

The project site is approximately 1 237ha in extent and comprises one (1) property, with a current land use zoning of "Agricultural". The Remaining Extent of Farm Vrienden 589 is not currently utilised for agricultural purposes. The project site is bordered by agricultural land to the north, south, east and west, while private hunting, and eco-tourism activities are also practised within the surrounding area. The site is also located adjacent to the Musina SEZ. The largest towns in proximity of the project site are Musina, Makhado and Thohoyandou located in the Musina, Makhado and Thulamela Local Municipalities, respectively, and the closest settlement to the project site is Mudimeli. The Huntleigh railway siding is situated to the eastern most point of the Remaining Extent of Farm Vrienden 589.

CHAPTER 9: ASSESSMENT OF IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct and indirect) expected to be associated with the development of Mutsho Solar PV3 and associated infrastructure. This assessment has considered the construction of a solar PV facility with a contracted capacity of up to 100MW, within a development footprint of approximately 177ha. The development footprint includes the following infrastructure:

- Solar PV array comprising PV panels and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- 33/132kV onsite substation (IPP Portion), including associated equipment and infrastructure – the onsite substation will be completely constructed as part of phase 1 (i.e., as part of Mutsho Solar PV1) but only equipped for the first 100MW. When such a time comes that the next 100 MW is constructed, the existing substation will be equipped for the additional 100MW generation capacity (i.e., additional transformers, extending the busbars, etc.). This approach will be followed as each 100MW facility is added to the cluster.
- Electrical and auxiliary equipment required at the Collection Station that serves the solar energy facility, including a switchyard/bay, control building, fences, etc.
- Cabling from the onsite substation to the Collection Station (either underground or overhead).
- Site offices, warehouses, and guardhouses.
- Water storage tanks at admin block for human consumption.
- Laydown areas.
- Internal gravel distribution roads

The full extent of the project site (~1 237ha) was considered through the Scoping Phase of the EIA process by the independent specialists and the EAP. On-site sensitivities were identified through the review of existing information, desktop evaluations and detailed field surveys. The identification of a development footprint for the solar PV facility within the project site was undertaken by the developer through consideration of the sensitive environmental features and areas, and application of a mitigation hierarchy which aimed at avoidance as the first level of mitigation. The specialist assessments undertaken as part of this EIA process have considered the development footprint (refer to **Figure 9.1**) which was provided by the developer.

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

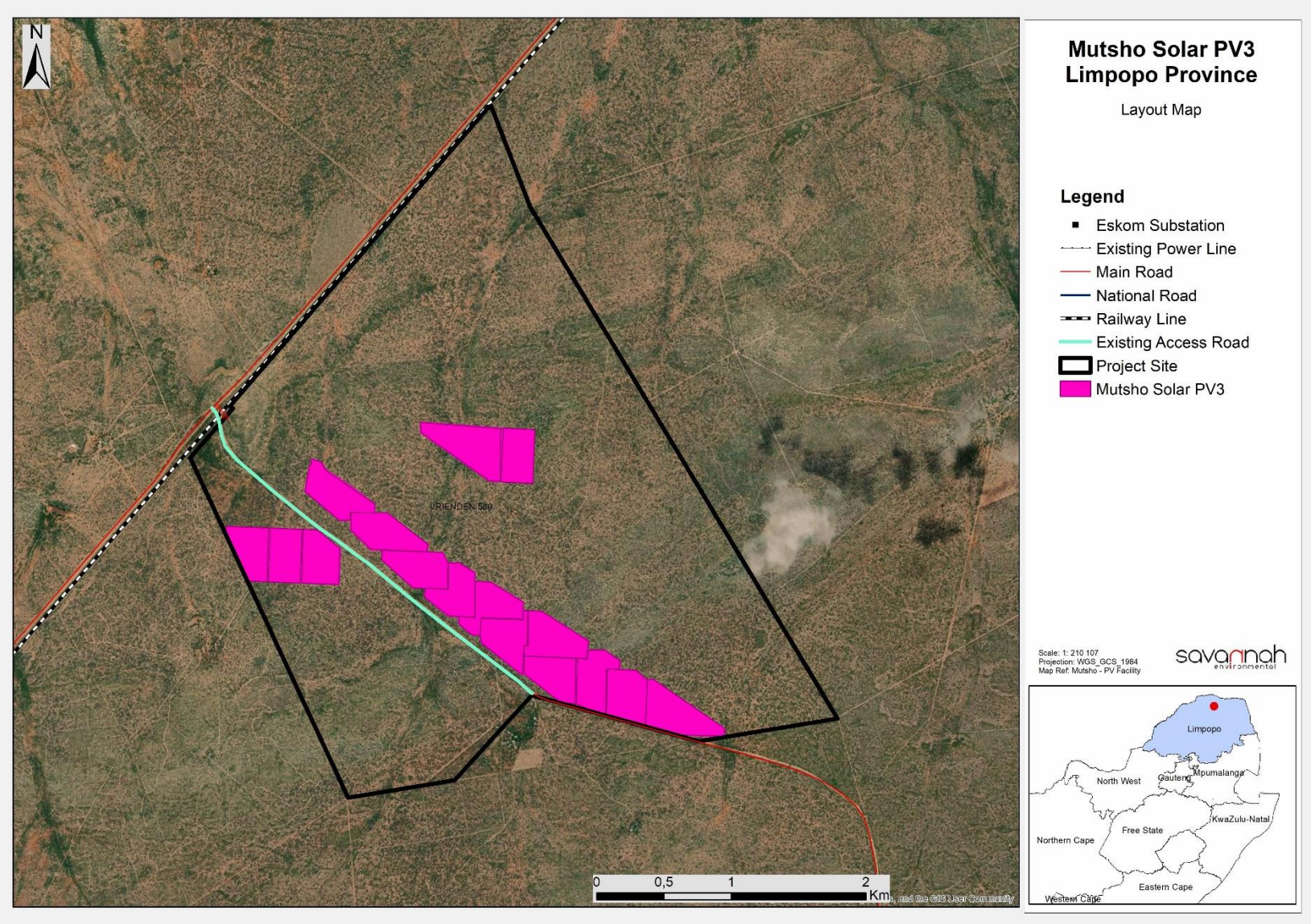


Figure 9.1: Map showing the project site within which the development footprint for Mutsho Solar PV3 and associated infrastructure has been placed and assessed as part of this EIA process (also refer to **Appendix L** for maps).

The development of the project will comprise the following phases:

» *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads, construction camps, batching plant, laydown areas, and facility infrastructure; construction of foundations involving excavations and cement pouring; the transportation of components/construction equipment to site; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for Mutsho Solar PV3 is estimated up to 18 months.

» *Operation* – will include the operation of the solar facility and the generation of electricity, which will be fed into the national grid via new a new onsite collector substation and a new 132kV overhead power lines (which will be assessed in a separate BA process). The operation phase of Mutsho Solar PV3 is expected to be approximately 25 years (with maintenance).

» *Decommissioning* – at the end of the project's life, decommissioning will include site preparation, disassembling of the components of the solar facility, clearance of the relevant infrastructure at the site and rehabilitation.

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

This chapter of the EIA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(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 Mutsho Solar PV3, including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in **sections 9.3.2, 9.4.2, 9.5.2, 9.6.2, 9.7.2, 9.8.2, 9.9.2, 9.10.2,** and **9.11.2.**
3(1)(h)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	The positive and negative impacts associated with the development of Mutsho Solar PV3 are included in **sections 9.3.2, 9.4.2, 9.5.2, 9.6.2, 9.7.2, 9.8.2, 9.9.2, 9.10.2,** and **9.11.2**.
3(1)(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 Mutsho Solar PV3 are included in **sections 9.3.2, 9.4.2, 9.5.2, 9.6.2, 9.7.2, 9.8.2, 9.9.2, 9.10.2,** and **9.11.2**.
3(1)(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report 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	A description of all environmental impacts identified for Mutsho Solar PV3 during the EIA 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 9.3.2, 9.4.2, 9.5.2, 9.6.2, 9.7.2, 9.8.2, 9.9.2, 9.10.2,** and **9.11.2**.

Requirement	Relevant Section
an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
3(1)(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 Mutsho Solar PV3, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in **sections 9.3.2, 9.4.2, 9.5.2, 9.6.2, 9.7.2, 9.8.2, 9.9.2, 9.10.2,** and **9.11.2**.
3(1)(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as well as for inclusion as conditions of authorisation.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in **sections 9.3.2, 9.4.2, 9.5.2, 9.6.2, 9.7.2, 9.8.2, 9.9.2, 9.10.2,** and **9.11.2**.

9.2. Quantification of Areas of Disturbance on the Site

Site-specific impacts associated with the construction and operation of Mutsho Solar PV3 relate to the direct loss of vegetation and species of special concern, disturbance of animals and loss of habitat and impacts on soils. In order to assess the impacts associated with Mutsho Solar PV3, it is necessary to understand the extent of the affected area.

The development footprint (**Figure 9.1**) will include affected areas, which will comprise of PV modules (mounted on either a fixed tilt or single axis tracker structure, dependent on optimisation, technology available and cost) at a height of up to 3m, main access road (consisting of the existing of an existing main road traversing the site), internal access roads (width of up to 4.5m), 33/132kV onsite substation (~0.65ha), a Battery Energy Storage System (with a capacity of 40MW/80MWh within an extent of 1ha), and a laydown area. The maximum area of disturbance is approximated to be ~1237ha in extent (this is also the extent of the development footprint), some of which will be temporary and will be rehabilitated following construction.

Wherever possible, existing access roads will be utilised to access the project site and development footprint, essentially reducing the extent of disturbance resulting from access road construction. It is unlikely that access roads will need to be upgraded as part of the proposed development.

9.3. Potential Impacts on Terrestrial Ecology (including flora and fauna) and Freshwater Ecology

The development of Mutsho Solar PV3 is likely to result in a variety of impacts associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as PV panels and service areas, roads, operations buildings etc. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details).

9.3.1 Results of the Terrestrial and Freshwater Ecology Impact Assessment

Sensitivities that occur specifically within the project site for Mutsho Solar PV3 that may be vulnerable to impact from the proposed project are as follows (refer to **Figure 9.2 and Figure 9.3**):

- Density of protected trees (*Boscia albitrunca; Adansonia digitata;* and *Sclerocarya birrea subsp. Caffra*) – very high sensitivity (no-go)
- Closed Woodland – high sensitivity
- Rocky Area – high sensitivity
- Watercourses - high sensitivity
- Mopane Bushveld – medium sensitivity
- Watercourses - high sensitivity
- 15m Buffer: Ephemeral drainage lines/ features – high sensitivity

Based on the specialist assessment, it was concluded that the project area falls within an ESA1, Vhembe Biosphere Reserve, the Musina Mopane Bushveld vegetation type and has a known occurrence of fauna SCCs found in and around the project area as well as protected tree species. No protected areas were found withing 5km of the project area. The closest reserve is the Boabab Private Nature Reserve that is located ~5 km from the project area.

The field assessment was conducted in the winter season and is regarded as a follow up survey for the assessment performed by Bathusi Environmental Consulting (2018) in the summer.

Four habitat units were identified during the assessment and included closed woodland, a rocky area, watercourses, and mopane bushveld. The sensitivity of these habitats ranged from high to medium with the closed woodland, rocky area and watercourses regarded as high sensitivity due to the species recorded and the role of this intact unique habitat to biodiversity, whilst the mopane bushveld is regarded as having a medium sensitivity.

During the field assessment 3 species of protected trees were observed: *Boscia albitrunca* (Shepard's tree), *Adansonia digitata* (Baobab), and *Sclerocarya birrea subsp. caffra* (Marula). It is essential that a search and rescue along with permit applications be done prior to the commencement of the development. The density of the trees is regarded a very high, especially in the case of *B. albitrunca*.

Thirteen (13) mammal species were observed during the survey of the project area based on either direct observation or the presence of visual tracks and signs. None of the species recorded are regarded as SCC. Three species of reptiles were recorded in the project area during survey period. However, there is the possibility of at least several species being present, as certain reptile species are secretive and longer-term surveys are required in order to ensure adequate sampling. No amphibian species were recorded during the survey period. None of the herpetofauna species recorded are regarded as threatened.

All freshwater features with their buffer areas have been classified as High sensitivity and should be regarded as "No-Go" areas during the life of the project, and all efforts must be made to prevent access to these areas from construction workers and machinery. Mitigated development in medium sensitivity areas is permissible.

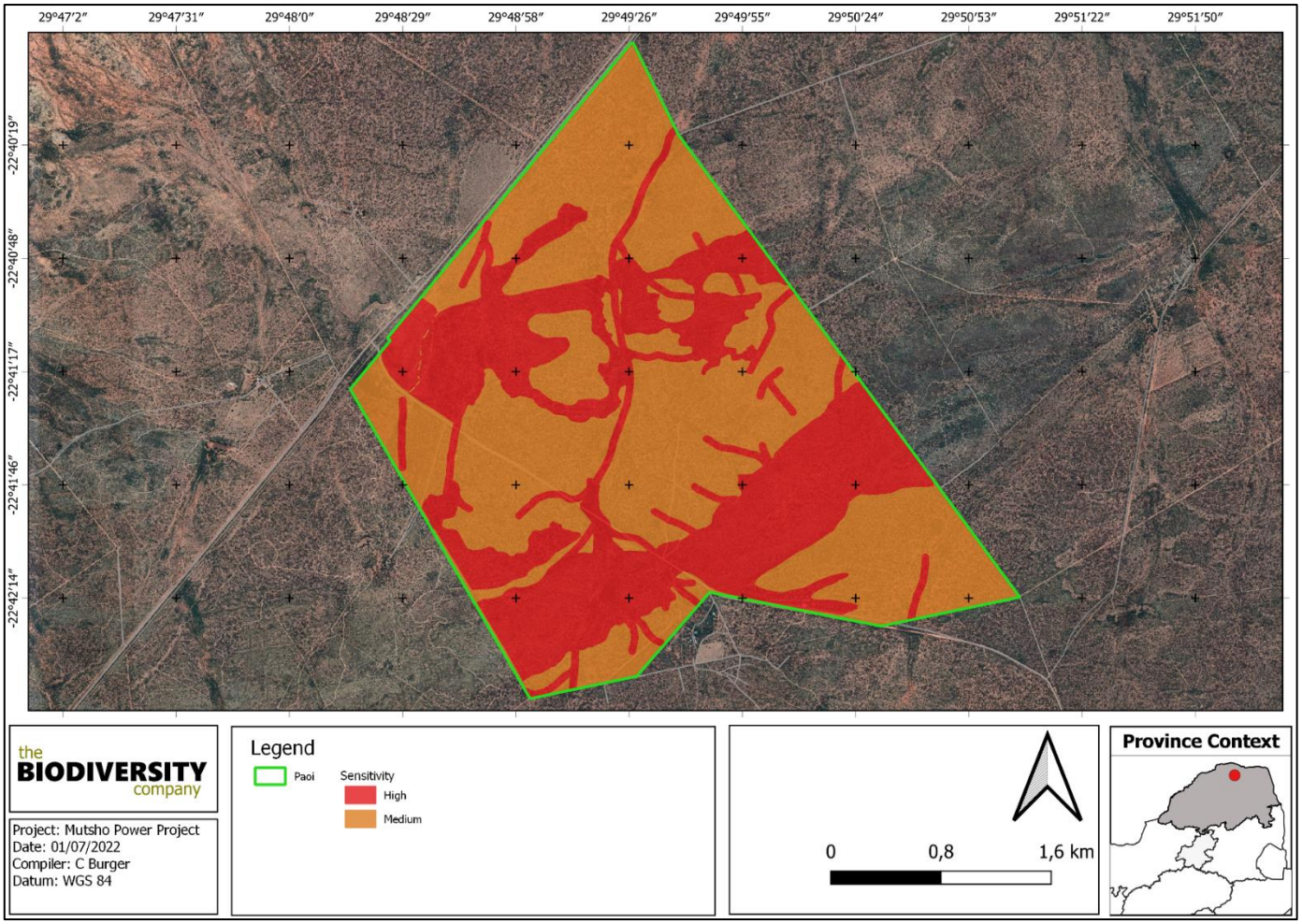


Figure 9.2: Terrestrial ecological sensitivity map of the project site

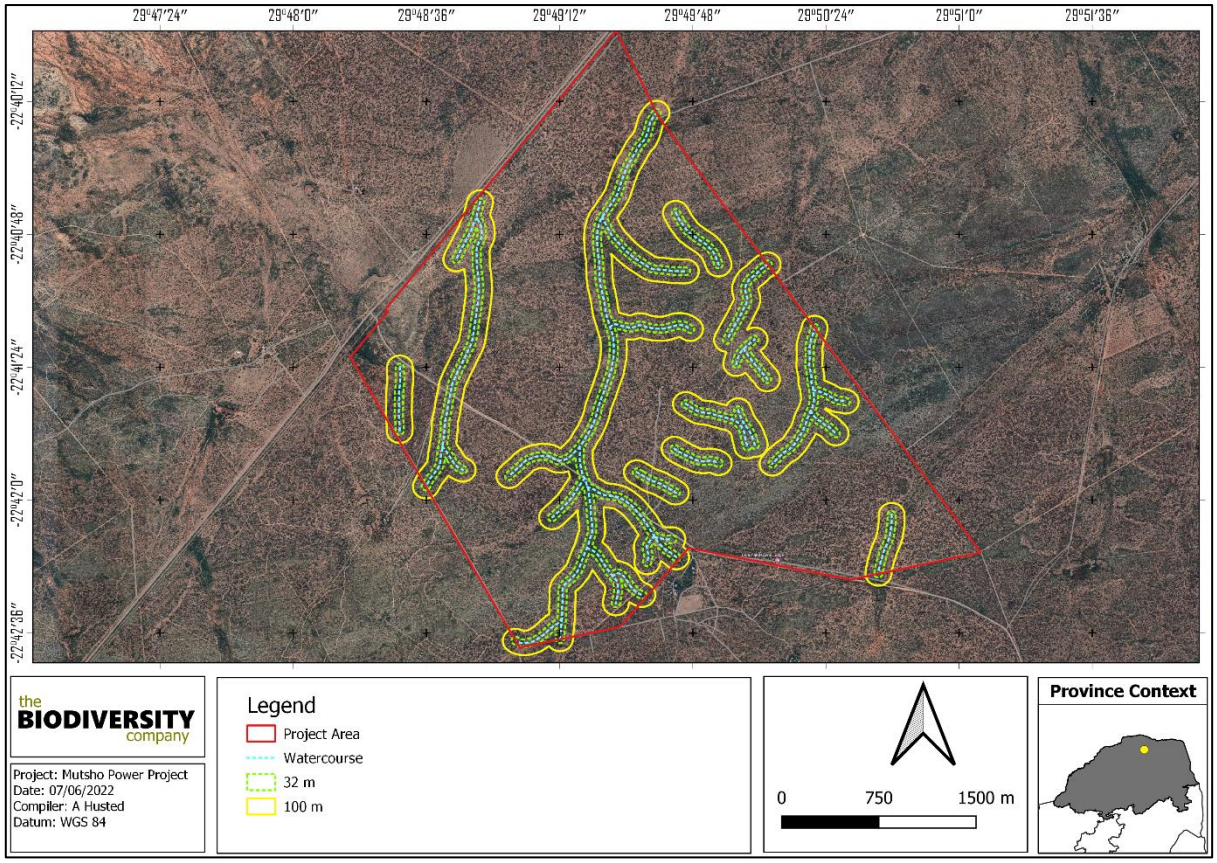


Figure 9.3: Freshwater sensitivity map for the project site

9.3.2 Description of Impacts on Terrestrial and Freshwater Ecology

Potential ecological impacts resulting from the proposed development would stem from a variety of different activities and risk factors associated with the construction and operation phases of the project including the following:

Construction:

- Human presence and uncontrolled access to the site may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purpose.
- Anthropogenic activities drive habitat destruction, causing displacement of fauna and flora and possibly direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.
- Soil compaction and increased erosion risk would occur due to the loss of plant cover and soil disturbance created during the construction phase. This may potentially impact the downstream watercourses, wetlands and aquatic habitats, mainly due to an increase of surface water and silt inflow from the surrounding disturbed areas (these potential impacts on downslope wetland features have been assessed within the freshwater resource study and assessment). These potential impacts may result in a reduction in the buffering capacities of the landscape during extreme weather events.
- Movement of construction vehicles and placement of infrastructure within the boundary of the drainage line may lead to the disturbance of these habitats, removal of vegetation cover and a potential increase in erosion which may eventually spread into downstream areas.

- Invasion by alien plants may be attributed to excessive disturbance to vegetation, creating a window of opportunity for the establishment of these alien invasive species. In addition, regenerative material of alien invasive species may be introduced to the project site by machinery traversing through areas with such plants or materials that may contain regenerative materials of such species.
- Destruction of protected plant species
- Presence and operation of construction machinery on the project site. This will create a physical impact as well as generate noise, potential pollution and other forms of disturbance at the site.
- Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.
- Disturbance/ displacement/ loss of instream habitat (Habitat fragmentation),
- Contamination of watercourse and alteration of water quality; and
- Alteration of catchment hydrology.

Operation:
- Continued fragmentation and degradation of habitats and ecosystems.
- Spread of alien and/or invasive species.
- Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration).
- Contamination of watercourse and altered water quality.
- Alteration of catchment hydrology and associated habitat ecology impacts.

Decommissioning:
- During decommissioning, the potential impacts will be very similar to that of the Construction Phase, although with slightly lower significance.

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

Construction Phase Impacts

Nature: *Loss of vegetation within the development footprint* Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Local Area (3)
Duration	Permanent (5)	Long term (4)
Magnitude	Very High (10)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**High (76)**	**Medium (52)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	
Mitigation: » Limiting the impact area and construction activities to the proposed footprint area and the associated infrastructure servitude only.		

» Existing roads/servitudes should be considered first option over the construction of new roads/servitudes, which must only be made where necessary.
» Minimise the extent of vegetation clearing for the infrastructure. Areas to be cleared must be clearly/visibly demarcated to avoid unnecessary clearing.
» Fire management plan must be in place for the areas surrounding the project area and the road to restrict the impact from fire on the natural flora and fauna communities.
» Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other areas in need of stabilisation and vegetation cover.

Residual Impacts:
The loss of currently intact vegetation and destruction of protected tree species is an unavoidable consequence of the project and cannot be entirely mitigated. The disturbance may also cause some erosion and invasive alien plant encroachment. Movement corridors will be disrupted in the area.

Nature: *Introduction of alien species, especially plants*

Degradation and loss of surrounding natural vegetation arising from construction activities and dust precipitation.

	Without mitigation	**With mitigation**
Extent	Regional (4)	Local Area (3)
Duration	Long term (4)	Moderate (3)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:
» Compile and implement an alien vegetation management plan from the onset of construction. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must also prescribe a monitoring plan and be updated as/when new data is collated;
» Remove organic waste from site weekly to prevent pest species from becoming a problem. A waste management plan must be compiled and implemented from the onset of the construction phase. The plan must designate collection areas, define the separation of waste and also prescribe removal measures and frequencies from the areas. This plan must be also prescribing a monitoring plan and be updated as/when new data is collated.

Residual Impacts:
Long-term broad scale IAP infestation if not mitigated.

Nature: *Destruction of protected plant species*

Loss of protected plant species, mainly nationally protected.

	Without mitigation	**With mitigation**
Extent	Regional (4)	Local Area (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**High (68)**	**Medium (56)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low

Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	The plant SCCs require a permit for destruction and/or relocation.	

Mitigation:

» A field assessment to identify any other protected trees on the project site must be completed prior to the commencement of the project.
» Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual to be removed or destroyed due to the development.
» High visibility flags must be placed near any protected plants outside the development boundary in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program.
» All protected plants should be relocated where possible.

Residual Impacts:

The loss of some of the protected species are unavoidable.

Nature: *Displacement of faunal community due to habitat loss, direct mortalities and disturbance (including possible SCC)*

Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.

	Without mitigation	**With mitigation**
Extent	Regional (4)	Local Area (3)
Duration	Long term (4)	Moderate (3)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated. Impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	

Mitigation:

» Signs must be put up stating that should any person be found poaching any species they will be fined. This should also be communicated through toolbox talks.
» Construction must take place in the winter months as much is feasible.
» The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments, access to these areas must be controlled.
» Signs must be put up to enforce this.
» Speed limits must be implemented on all roads.
» Areas should be cleared and disturbed on a needs basis only, as opposed to clearing and disturbing a number of sites simultaneously.
» Any holes/deep excavations must be done in a progressive manner on a needs basis only. No holes/excavations may be left open overnight. In the event holes/excavations are required to remain open overnight, these areas must be covered to prevent fauna falling into these areas.
» Where possible, work should be restricted to one area at a time and be systematic. This is to reduce the number and extent of on-site activities, allowing fauna to move off as the project progresses. This will give the smaller mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.
» All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform

contractors and site staff of the presence of SCC, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr.
» Prior to vegetation clearing activities, the area to be cleared should be walked on foot by 1-2 individuals to create a disturbance in order for fauna to move off. Sites should be disturbed only prior to the area having to be cleared, not more than 1 day in advance.
» The timing between clearing of an area and subsequent development must be minimized to avoid fauna from re-entering the site to be disturbed.

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.

Nature: *Disturbance/ displacement/ loss of riparian, marginal and instream riverine habitat (Habitat fragmentation)*

Destruction, loss and fragmentation of the of habitats, ecosystems and biotic community responses to the alteration of the catchment for solar, grid and associated infrastructure.

	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint & surrounding area (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**Medium (65)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable. However, the construction footprint can be realigned to avoid/minimise disturbance to drainage features and associated buffers	

Mitigation:
» Buffer zones must be adhered too.
» Infrastructure such as roads, cables must traverse watercourses in a perpendicular direction (preferable).
» Implement stormwater management measures.
» Minimise the unnecessary (and unauthorised) clearance of indigenous vegetation.
» Minimise disturbance footprint areas.
» Construction of watercourses crossings must be prioritized for the winter months.
» Prevent uncontrolled vehicle and machine access through and within watercourses.
» Erosion and sedimentation into the drainage lines must be minimised through the land scaping to gentle gradients and the re-vegetation of any disturbed areas.
» Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses that are drought tolerant) to protect the exposed soil.
» Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential associated with steep slopes and bare/exposed soils.

Residual Impacts:
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact following mitigation would however be low for the construction phase with focus on limiting erosion required.

Nature: *Pollution of water resources from construction activities*

Pollution stemming from construction activities (spills and leaks from machinery and construction materials, leaching from excavated soils and waste handling) that enters the natural environment and downslope watercourses, with

associated impacts to soils, habitat integrity and ecological function which in turn lowers the aquatic and terrestrial biodiversity dependent on the affected ecosystems, notably in times of surface water availability.		
	Without mitigation	**With mitigation**
Extent	Local area (3)	Site specific (1)
Duration	Short term (2)	Very short term (0–1 years) (1)
Magnitude	Moderate and will result in processes continuing but in a modified way (6)	Minor and will not result in an impact on processes (2)
Probability	Highly probable (4)	Probable (3)
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, although this impact cannot be well mitigated as some level of pollution is unavoidable, notably where powerline pylons and roads are to be built within drainage areas.	

Mitigation:

- Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the drainage systems.
- The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly.
- All chemicals and toxicants to be used for the construction must be stored outside the watercourses and in a bunded area.
- Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the environment;
- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.
- Mixing of concrete must under no circumstances take place within the drainage systems. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished.
- Implement stormwater measures.
- No dumping of construction material on-site may take place.
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.
- Make sure all excess consumables and building materials / rubble are removed from site and deposited at an appropriate waste facility.

Residual Impacts:

Some level of pollution is inevitable due to the nature of the construction activities and cannot be entirely mitigated. The residual impact following mitigation would however be low and of short duration for the construction phase.

Nature: *Alteration of catchment hydrology and associated habitat ecology impacts from construction activities*

Construction phase activities that result in the reshaping and change in vegetative cover density for solar infrastructure with associated alterations of slope, runoff velocities, infiltration capacity and sediment movement from baseline conditions. This is expected to occur across the catchment, with associated impacts to slope stability, habitat integrity and ecological function. This is especially of concern due to the high erodibility of catchment soils in this arid environment and keys areas would include active working areas (road network, PV area, grid infrastructure, etc) where bare soils are exposed to washaway. This is of special concern in the PV area due to the extent of the alluvial fan drainage feature.

	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint & surrounding area (2)

Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the hydrology alterations are unavoidable and long term. However, the construction footprint can be realigned to avoid watercourses and associated buffers	

Mitigation:

» Buffer zones must be adhered too.
» Watercourses crossings must not impeded flow.
» Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses that are drought tolerant) to protect the exposed soil.
» Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential associated with steep slopes and bare/exposed soils.

Residual Impacts:

Alteration of the catchment hydrology is inevitable due to the nature of the construction activities and cannot be entirely mitigated. The residual impact following mitigation would however be low and of short duration for the construction phase.

Operation Phase Impacts

Nature: *Continued fragmentation and degradation of habitats and ecosystems*

Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.

	Without mitigation	**With mitigation**
Extent	Local Area (3)	Footprint & surrounding areas (2)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated.	

Mitigation:

» It should be made an offence for any staff to /take bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.
» Implementation of an alien vegetation management plan.
» The area must be demarcated and no disturbance is to be allowed outside the direct development footprint.

Residual Impacts:

There is still some potential for erosion and IAP encroachment even with the implementation of control measures. Impacts will however be low with the implementation of control measures.

Nature: *Spread of alien and/or invasive species*

Degradation and loss of surrounding natural vegetation.

	Without mitigation	**With mitigation**
Extent	Regional (4)	Footprint & surrounding areas (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» Implementation of an alien vegetation management plan.
» Implementation of a waste management plan. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis (as a minimum) to prevent rodents and pests entering the site. No waste is to be burned on site.
» Refuse bins must be emptied and secured.
» Temporary storage of domestic waste must be in covered waste skips.
» Maximum domestic waste storage period will be 7 days.
» A pest control plan must be put in place and implemented; it is imperative that poisons not be used.

Residual Impacts:

Long term broad scale IAP infestation if not mitigated.

Nature: *Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, noise, light, dust, vibration)*

The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.

	Without mitigation	**With mitigation**
Extent	Local Area (3)	Footprint & surrounding areas (2)
Duration	Long term (4)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (60)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» Lighting should be kept to a minimum to avoid disturbing crepuscular and nocturnal species. Lighting fixtures should be fitted with baffles, hoods or louvres and directed downward, to minimize light pollution which could attract night migrating species.
» Lighting should be directed towards to footprint area and avoid unnecessary illumination of the adjacent undeveloped areas.
» Where feasible, motion detection lighting must be used to minimise the unnecessary illumination of areas.
» Avoid using any road on site during the night.
» Fences must have 30 x 30 cm holes in at the bottom at every 250m to allow for free movement of fauna.
» All operation vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed.

» All vehicles accessing the site should adhere to a low-speed limit on site (40 km/h max) to avoid collisions with susceptible fauna, such as nocturnal species which sometimes forage or rest on roads, especially at night.
Residual Impacts:
» Disturbance from maintenance activities will occur albeit at a low and infrequent level. » Less migratory species will be found in the area. » Road killings are still a possibility. » Migratory routes of fauna will change, fauna and flora species composition will change.

Decommissioning Phase Impacts

Nature: *Continued fragmentation and degradation of habitats*		
	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint and surrounding areas (2)
Duration	Long term (4)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Very improbable (1)
Significance	**Medium (60)**	**Low (5)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: » Implementation of a rehabilitation plan. » Implementation of an alien invasive management plan and monitoring on an annual basis for 3 years post decommissioning. » 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.		

Nature: *Displacement of faunal community due to disturbance (road collisions, noise, dust, vibration).*		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Local Area (3)
Duration	Long term (4)	Moderate term (3)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: » Dust management needs to be undertaken in the areas where the infrastructure will be removed. This includes wetting of the soil. This area must be rehabilitated as soon as possible. » All vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the decommissioning area. » All vehicles accessing the site should adhere to a low-speed limit on site (40 km/h max) to avoid collisions with susceptible fauna, such as nocturnal species which sometimes forage or rest on roads, especially at night.		

» The area must be walked through prior to decommissioning to ensure fauna species are not affected by the removal of the infrastructure.
Residual Impacts:
If this is mitigated and monitored correctly no residual impacts should be present.

Nature: *Continued disturbance/ displacement/ loss of riparian, marginal and instream riverine habitat*

Disturbance created during the construction phase will leave the project area and watercourses vulnerable to erosion (highly erodible catchment) and encroachment by alien vegetation. The operational phase activities will result in the continued destruction, loss and fragmentation of habitats, ecosystems and biotic community responses.

	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint & surrounding area (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High (65)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	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:

» Buffer zones must be adhered too.
» Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses that are drought tolerant) to protect the exposed soil.
» Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential associated with steep slopes and bare/exposed soils.

Residual Impacts:

Despite mitigation, erosion is expected across the project footprint, influencing downslope watercourses and habitat, especially where roads and powerline pylons intercept with watercourses. The residual impact following mitigation would however be low.

Nature: *Pollution of water resources from operational activities*

The operation and maintenance of the proposed development will involve the cleaning of the solar panel with chemicals which has the potential to pollute soils (should chemicals be used) and in times of flow will pollute surface runoff from contaminated soils and enter into the downslope watercourses, with associated impacts to habitat integrity and ecological function which in turn lowers the aquatic and terrestrial biodiversity dependent on the affected ecosystems. Further pollution impacts can be expected from hydrocarbons (fuels, oil, etc) from leaking maintenance vehicles which escape into the environment along the road network, entering downslope watercourses during rainfall events, with similar impacts to water quality and ecological functioning.

	Without mitigation	**With mitigation**
Extent	Local area (3)	Site specific (1)
Duration	Moderate term (5–15 years) (3)	Very short term (0–1 years) (1)
Magnitude	Moderate and will result in processes continuing but in a modified way (6)	Minor and will not result in an impact on processes (2)
Probability	Definite (5)	Probable (3)
Significance	**Medium (60)**	**Low (12)**

Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as some level of pollution is unavoidable. Despite this spill kits and other spill prevention measures should be in place	

Mitigation:

» Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the drainage systems.
» All chemicals and toxicants to be used for the construction must be stored outside the watercourses and in a bunded area.
» Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the environment;
» All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.
» Implement stormwater measures.
» No dumping of construction material on-site may take place.
» All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.
» Make sure all excess consumables and building materials / rubble are removed from site and deposited at an appropriate waste facility.

Residual Impacts:

Some level of pollution is inevitable due to the nature of the operational activities and cannot be entirely mitigated. The residual impact following mitigation would be Low and of short duration following the implementation of mitigation.

Nature: *Alteration of catchment hydrology and associated habitat ecology impacts from operational activities*

As a result of the landscaping to new topography and change in vegetative cover type and density below the solar panels, together with increased hardened surfaces from solar panels and road network, new functioning regimes pertaining to surface runoff, infiltration and sediment movement patterns will influence the adjacent natural habitat characteristics. This in turn will potentially influence habitat integrity and ecological functioning, notably from increased return flows (surface runoff), erosion and instream sedimentation impacts. This would be applicable to habitat and watercourse features in proximity to the proposed infrastructure, notably the powerline pylons and downslope areas of the road network and PV area.

	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint & surrounding area (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the hydrology alterations are unavoidable. However, the operational activities need to avoid direct impacts to watercourses and associated buffers (no-go areas), notably erosion.	

Mitigation:

» Buffer zones must be adhered too.
» Watercourses crossings must not impeded flow. Crossing must be inspected on a regular basis for blockages.

» Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses that are drought tolerant) to protect the exposed soil. » Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential associated with steep slopes and bare/exposed soils.
Residual Impacts: Residual impacts following mitigation are largely related to altered surface runoff and erosion due to altered hydro-dynamics and erodibility of the associated catchment.

9.3.4 Overall Result

Terrestrial Ecology

Four habitat units were identified during the assessment and included closed woodland, a rocky area, watercourses, and mopane bushveld. The sensitivity of these habitats ranged from high to medium with the closed woodland, rocky area and watercourses regarded as high sensitivity due to the species recorded and the role of this intact unique habitat to biodiversity, whilst the mopane bushveld is regarded as having a medium sensitivity.

A total of 72 plant species were found within the project/study area, which consisted of 67 native, 0 Red List, 4 protected, 0 SA endemic, 0 alien, and 1 NEM:BA listed invasive species.

A total of 13 mammal, 0 amphibian, and 3 reptile species were recorded within the project/study area. No amphibian or reptile SCC were recorded within the study area; and no mammal SoCC were recorded, namely. It was determined that the development will not detrimentally impact these populations as no faunal SCC were recorder within the project/study area.

During the field assessment 3 species of protected trees were observed: *Boscia albitrunca* (Shepard's tree), *Adansonia digitata* (Baobab), and *Sclerocarya birrea subsp. caffra* (Marula). It is of vital importance that a search a rescue along with permit applications be done prior to the commencement of the development. The density of the trees is regarded a very high especially in the case of *B. albitrunca*.

Biodiversity maintenance is one key ecological service provided by the identified terrestrial biodiversity areas through their ecological integrity, importance and functioning. As such the preservation of these systems is an important aspect to consider for the proposed project.

Any development in high sensitivity areas must be avoided as far as possible, which will occur with the selection of the project area. Development within the high sensitivity areas within the project area will lead the direct destruction and loss of functional habitats; and the faunal species that are expected to utilise this habitat. Thus, if these areas are not maintained in a natural or near natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved. The mitigation measures, management and associated monitoring regarding the expected impacts will be the most important factor of this project and must be considered by the issuing authority.

Freshwater Ecology

One (1) form of a watercourse was identified and delineated within the regulated area applied, namely ephemeral drainage lines/ features. Natural wetlands were absent from the project area. The nearest known 'pan' system is more than 3 km north-west of the project area. No functional assessment was completed for the delineated watercourses. A buffer width of 15 m is recommended for each of the drainage features.

Regulated areas delineated with a 32m and 100m buffer were also identified and recommended for each drainage feature.

Considering the findings of the assessment, no fatal flaws were identified from a freshwater ecology perspective. Provided that the mitigation is successfully implemented, the specialist is of the opinion that the establishment of the proposed solar facility is unlikely to pose a significant threat to local watercourses with all anticipated impacts having a Low residual risk rating. Supporting remediation measures prescribed herein should also be considered for a project specific stormwater management

9.4. Potential Impacts on Avifauna

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

9.4.1 Results of the Avifauna Impact Assessment

Summary Pre-Construction Bird Monitoring

Fifty-seven (57) bird species were recorded in the survey. They are Southern Pale Chanting Goshawk (*Melierax canorus*), Helmeted Guineafowl (*Numida meleagris*), African Harrier-Hawk (*Polyboroides typus*) and Pied Crow (Corvus albus). Four SCCs, Kori Bustard (*Ardeotis kori*); Black Stork (*Ciconia nigra*); Saddle-billed Stork (*Ephippiorhynchus senegalensis*), and White-backed Vulture (*Gyps africanus*) were recorded by Pachnoda (2018) which does increase the overall sensitivity of the area. Three species that are regarded as risk species were however recorded. Risk species are species that would be sensitive to habitat loss, that are regarded as collision prone species and species that would have a high electrocution risk. Even though the panels do not pose an extensive collision risk for larger birds, power lines associated with the infrastructure, guidelines (anchor lines) and connection lines do pose a risk. The substation could cause an electrocution risk. The fence could also pose a collision risk for various species.

Site Sensitivity

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, while the fauna sensitivity was rated as 'Moderate'. The moderate rating is based on the moderate likelihood of Bateleur (*Terathopius ecaudatus*) occurring. The very high terrestrial sensitivity was due to the CBA2 and ESA1 status of the project area as well as the FEPA sub catchment with which the project area overlap.

Based on the avifauna impact assessment, all habitats within the assessment area of the proposed project were allocated a sensitivity category (refer to **Table 9.1**). The SCC species recorded in the Pachnoda (2018) report were taken into account for the sensitivity assessment.

Table 9.1: SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Wetlands	High	High	High	Medium	High
Closed Woodland	High	High	High	Medium	High
Mopane Bushveld	Medium	Medium	Medium	Medium	Medium
Rocky Areas	Medium	Medium	Medium	Medium	Medium

The resultant avifaunal sensitivity of the preferred site has been mapped in relation to the indicative development layout (refer to **Figure 9.4**).

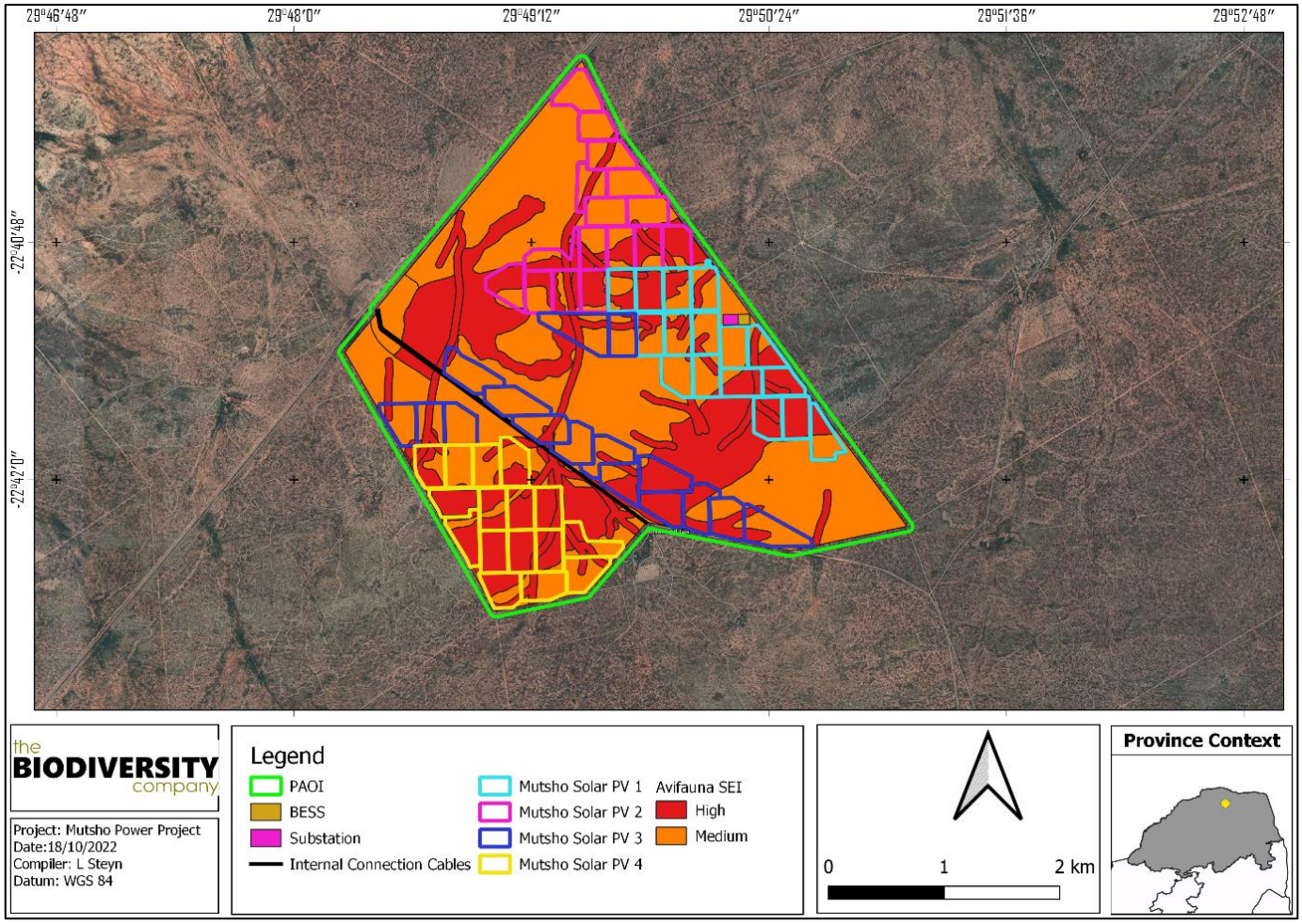


Figure 9.4: Avifaunal sensitivities overlain on the indicative layout.

9.4.2 Description of Avifaunal Impacts

The following key potential impacts on avifauna, arising from the proposed development of the solar energy facility and associated infrastructure, have been identified for assessment:

Construction Phase:

- During the construction phase vegetation clearing and brush cutting of vegetation for the associated infrastructure will lead to direct habitat loss;
- Vegetation clearing will create a disturbance and will therefore potentially lead to the displacement of avifaunal species;
- Collection of eggs and poaching;
- The operation of construction machinery on site will generate noise and cause dust pollution; and
- Should non-environmentally friendly dust suppressants be used, chemical pollution can take place. Increased human presence can lead to poaching and the increase in vehicle traffic will potentially lead to roadkill.

Operation phase:

- Collisions with PV panels, and connection lines and fences;
- Electrocution with solar plant connections and substation;
- Roadkill during maintenance procedures; and

» Habitat degradation and displacement of resident, visiting and breeding species (as well as SCCs).

Decommissioning phase:

» Continued fragmentation and degradation of habitats;
» Displacement of avifaunal community (including SCC) due disturbance (road collisions, noise, dust, vibration).

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

Construction Phase Impacts

Nature: *Destruction, fragmentation and degradation of habitats*		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Local Area (3)
Duration	Permanent (5)	Long term (4)
Magnitude	Very High (10)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**High (76)**	**Medium (52)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To some extent, habitat will still be lost	
Mitigation: » The loss of habitat in the project footprint cannot be negated but can be restricted to some extent. The loss of habitat will result in the loss of territory, feeding area, nesting sites and prey availability for numerous species. » The habitat outside the footprint can be protected by implementing the following mitigations: » Construction activity to only be within the project footprint and the area is to be well demarcated. » Areas where vegetation has been cleared must be re-vegetated within local indigenous plant species. » The affected area must be monitored for invasive plant encroachment and erosion and must be controlled. » The use of laydown areas within the development footprint must be used, to avoid habitat loss and disturbance to adjoining areas. » All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. » Should any Species of Conservation Concern not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken. » Infrastructure must be grouped to reduce the unnecessary spread of infrastructure. Onsite lines must be placed underground as far as possible.		
Residual Impacts: The loss of habitat is a residual impact that is unavoidable. The disturbance may also cause some erosion and invasive alien plant encroachment. Movement corridors will be disrupted in the area. The destruction of the large trees including protected trees such as Baobab will lead to the loss of nest sites for larger predatory bird species including possible SCCs and priority species.		

Nature: *Displacement of avifaunal community (Including several SCC) due to disturbance such as noise, light, dust, vibration*		
	Without mitigation	**With mitigation**

Extent	Regional (4)	Local Area (3)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, but only to a limited extent. The mitigation of noise pollution during construction is difficult to mitigate against	

Mitigation:

» Minimize disturbance impact by abbreviating construction time. Schedule the activities to avoid breeding and movement time.
» Ensure lights are kept to a minimum, lights must be red or green and not white to reduce confusion for nocturnal migrants.
» Dust management need to be done in the areas where the vegetation will be removed, this includes wetting of the soil.
» Restrict footprint of development.

Residual Impacts:

Displacement of endemic and SCC avifauna species.

Nature: *Collection of eggs and poaching*

	Without mitigation	**With mitigation**
Extent	Regional (4)	Footprint and surrounding areas (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition.
» Signs must be put up stating that should any person be found poaching any species they will be fined.

Residual Impacts:

There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers

Nature: *Roadkill*

	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint and surrounding areas (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	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
» All vehicles (construction or other) accessing the site should adhere to a low-speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g., nightjars and owls) which sometimes forage or rest on roads, especially at night.

Residual Impacts:

Roadkill could still occur.

Operation Phase Impacts

Nature: *Collisions with PV panels and connection lines and fences*

	Without mitigation	**With mitigation**
Extent	Regional (4)	Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa.
» Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.
» If any power lines/connection lines are to be placed above ground, they must be marked with industry standard bird flight diverters.
» Fencing mitigations:
  » Top 2 strands must be smooth wire
  » Routinely retention loose wires
  » Minimum 30cm between wires
  » Place markers on fences

Residual Impacts:

Some collisions of SCCs might still occur regardless of mitigations

Nature: *Electrocution with solar plant connections and substation*

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

Probability	Highly probable (4)	Improbable (2)
Significance	**High (64)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» The design of the proposed solar plant and grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa.
» Infrastructure should be consolidated where possible/practical in order to minimise the amount of ground and air space used.
» Ensure that monitoring is sufficiently frequent to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible.
» During the first year of operation quarterly reports, summarizing interim findings should be complied and submitted to BirdLife South Africa. If the findings indicate that electrocutions have not occurred or are minimal with no red-listed species, an annual report can be submitted.

Residual Impacts:

Electrocutions might still occur regardless of mitigations

Nature: *Roadkill during maintenance procedures*

	Without mitigation	**With mitigation**
Extent	Local area (3)	Local area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (22)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» All personnel should undergo environmental induction with regards to avifauna and their behaviour on roads.
» All vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed.
» All vehicles accessing the site should adhere to a low-speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g., nightjars and owls) which sometimes forage or rest on roads, especially at night.
» Create and implement public awareness programmes with the aim to protect natural resources. Apply measures which include penalties to personnel if found with "bush meat".
» Implement biodiversity monitoring protocols.

Residual Impacts:

Road collisions can still occur regardless of mitigations

Nature: *Habitat degradation (including events such as fire, Alien Invasive plants and erosion) and displacement of resident, visiting and breeding species (as well as SCCs).*

	Without mitigation	**With mitigation**
Extent	Regional (4)	Local area (3)

Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	No, the footprint has already been disturbed. The area surrounding the development can be mitigated to some extent	

Mitigation:

» Minimising habitat destruction caused by the maintenance by demarcating the footprint so that it does not increase yearly.
» All areas where maintenance must be for example grass cutting walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.
» Compile and implement a fire management plan
» Compile and implement an erosion and stormwater management plan.
» Compile and implement an alien invasive plant control plan.

Residual Impacts:

Migratory routes of avifauna species could change, and the species composition could also change regardless of mitigations

Decommissioning Phase Impacts

Nature: *Continued fragmentation and degradation of habitats*

	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint and surrounding areas (2)
Duration	Long term (4)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Very improbable (1)
Significance	**Medium (60)**	**Low (5)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» Implementation of a rehabilitation plan.
» Implementation of an alien invasive management plan and monitoring on an annual basis for 3 years post decommissioning.
» 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.

Nature: *Displacement of avifaunal community (including SCC) due disturbance (road collisions, noise, dust, vibration).*

	Without mitigation	**With mitigation**
Extent	Regional (4)	Local area (3)

Duration	Long term (4)	Moderate term (3)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» Minimize disturbance impact by abbreviating construction time.
» Schedule the activities to avoid breeding and movement times report.
» Dust management need to be done in the areas where the vegetation will be removed, this includes wetting of the soil. This area must be rehabilitated as soon as possible.
» All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the decommissioning area.
» All vehicles (construction or other) accessing the site should adhere to a low-speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night.

Residual Impacts:

If this is mitigated and monitored correctly no residual impacts should be present.

9.4.4 Overall Result

Based on the desktop assessment the project area falls within an ESA1, Vhembe Biosphere Reserve, the Musina Mopane Bushveld vegetation type and have a known occurrence of avifauna SCCs found in and around the project area.

The field assessment was conducted in the winter season and is regarded as a follow up survey that was performed by Pachnoda (2018) in the summer. During this survey fifty-seven (57) bird species were recorded, none of which were an SCC, four species were however identified that is regarded as risk species due to collisions and electrocutions by PV plants and associated infrastructure. They are Southern Pale Chanting Goshawk (*Melierax canorus*), Helmeted Guineafowl (*Numida meleagris*), African Harrier-Hawk (*Polyboroides typus*) and Pied Crow (Corvus albus). Four SCCs, Kori Bustard (*Ardeotis kori*); Black Stork (*Ciconia nigra*); Saddle-billed Stork (*Ephippiorhynchus senegalensis*), and White-backed Vulture (*Gyps africanus*) were recorded by Pachnoda (2018) which does increase the overall sensitivity of the area.

The main impacts identified to be associated with the proposed project are the loss of habitat, including the loss of nest sites in larger trees such as the Baobabs that will be lost in the area, disturbance, collision and electrocution risk. These impacts are expected to have a large impact on the avifauna community and more specifically the SCCs that has been found and could likely occur in the area. Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts. Considering that this area has been identified as being of significance for biodiversity maintenance and ecological processes (Moderate and High sensitivity), development may proceed but with caution and only with the implementation of mitigation measures.

Considering the above-mentioned information, it is the opinion of the specialist that the project, may be favourably considered, on condition all prescribed mitigation measures and supporting recommendations are implemented.

9.5. Assessment of Impacts on Soils and Agricultural Potential

9.5.1 Results of the Soils and Agricultural Potential Assessment

The most sensitive soil forms identified within the assessment corridor is the Hutton and Nkonkoni soil forms. The assessment area is associated with arable soils, due to some of the type of soils available. However, the climate limits 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.

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which predominantly covers "Low" to "Moderate" sensitivities. Small patches are characterised by "Very Low" sensitivities (**Figure 9.5**). In the assessment area there is no segregation of agricultural lands or crop fields with high potentials. The land capability and land potential in the assessed area concur. The "Very Low to Moderate" sensitivities also falls within the DAFF, (2017) requirements for a compliance statement report only (refer to **Appendix F**).

9.5.2 Overall Result

It is the specialist's opinion that the proposed solar power project 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 power project may be favourably considered.

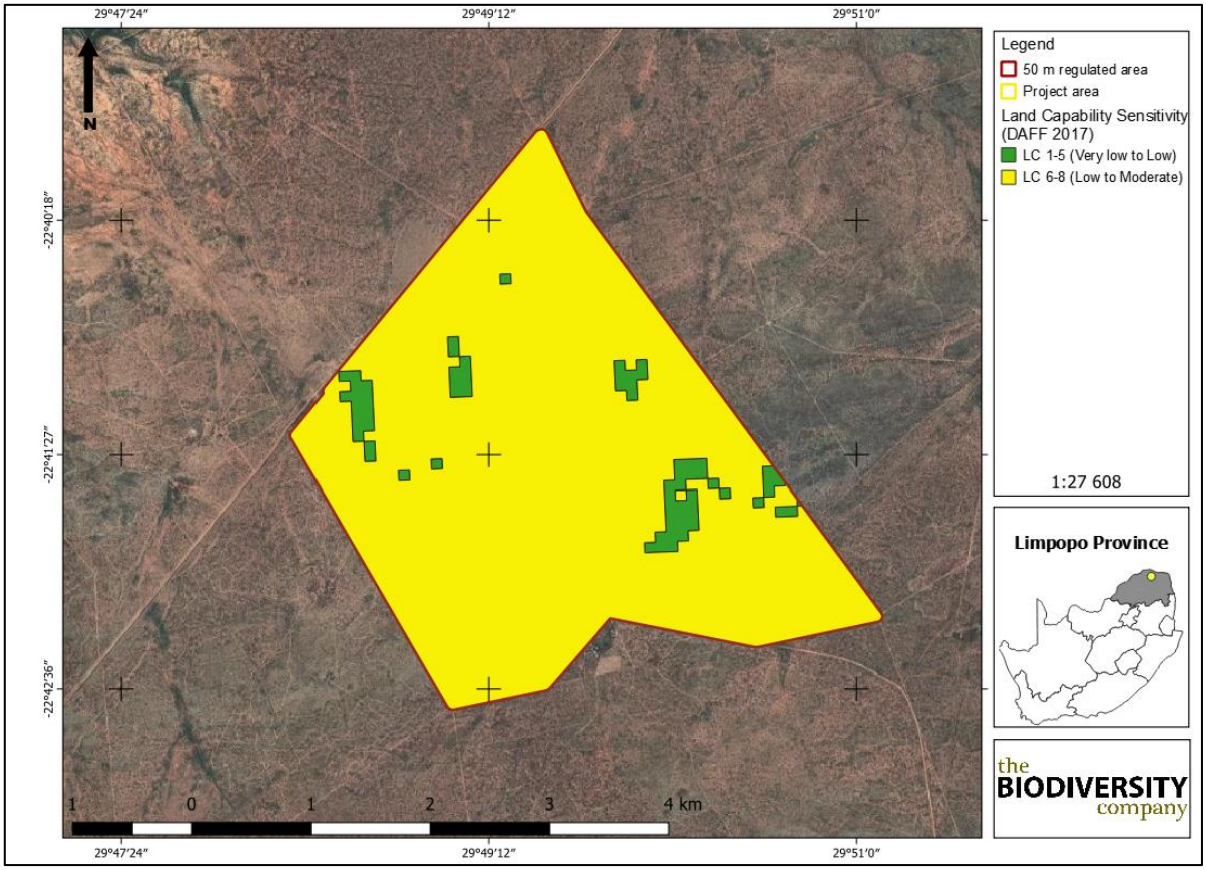


Figure 9.5: Land sensitivity capability for the project site (DAFF, 2017)

9.6. Assessment of Impacts on Heritage Resources (including archaeology, palaeontology and cultural landscape)

Various impacts have been identified with the development of Mutsho Solar PV3 from a heritage perspective. Potential impacts on heritage resources and the relative significance of the impacts associated with the development of Mutsho Solar PV3 are summarised below (refer to **Appendix G**).

9.6.1 Results of the Heritage Impact Assessment

Archaeology

Previous surveys of this area (Silidi and Pikirayi, 2013 and CTS Heritage, 2016 and 2018) identified several heritage resources across the study area/project site, of these, five fall within the area proposed for development.

None of the heritage resources identified fall within the area PV layout provided and as such, no direct impact to any heritage resources is anticipated.

The heritage resources that were identified fall within close proximity to the layout provided and as such, it is important that impact to the significant sites is avoided. It is recommended that the sensitive heritage areas identified in this report are avoided by any proposed development of new infrastructure.

Palaeontology

The area proposed for development falls within the summer rainfall region of South Africa, and has a mild, subtropical climate. The study area lies within a region of variable geology that includes sediments of the:

» Undifferentiated Karoo Basin; Tshipise and Tuli Sedimentary Basin and Solitude Formation; and
» the Malala drift Gneiss and Gumbu Group of the Beit Bridge Complex, Archaean Granite-Gneiss Basement.

According to the SAHRIS Palaeosensitivity Map (refer to **Figure 9.6**), the area proposed for development is located on sediments of moderate and zero palaeontological sensitivity. An area of very highly sensitive geology is identified to the north of the development area, however no impact to these palaeontologically sensitive deposits is anticipated based on the layout provided.

A field assessment identified no fossil remains within the footprint of the proposed development area. The PIA notes that "The scarcity of fossil heritage at the proposed development footprint indicate that the impact of the (of the development) will be of a low significance in palaeontological terms. Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources."

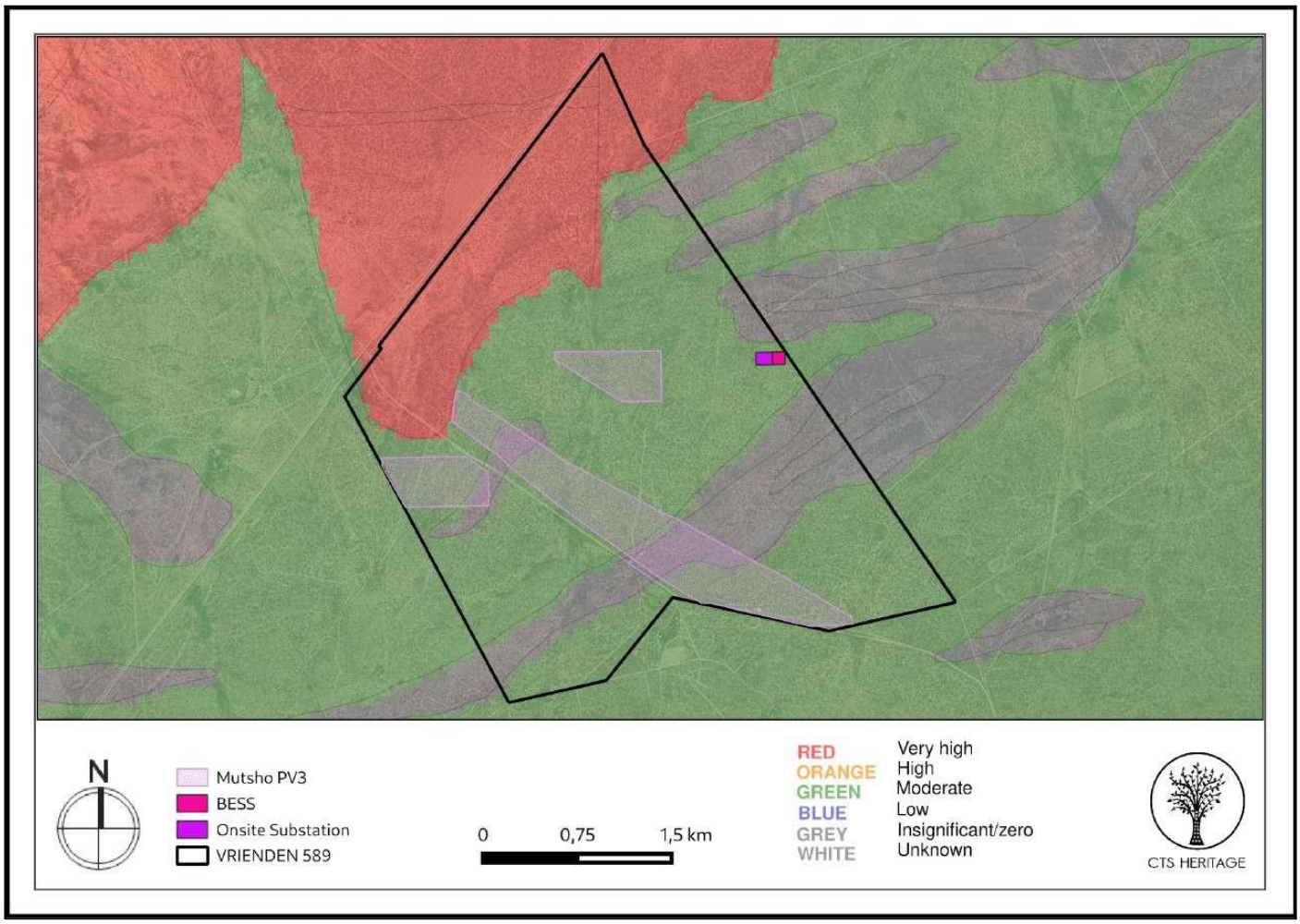


Figure 9.6: Map showing the palaeontological sensitivity of the site and palaeontological heritage resources identified within the project site

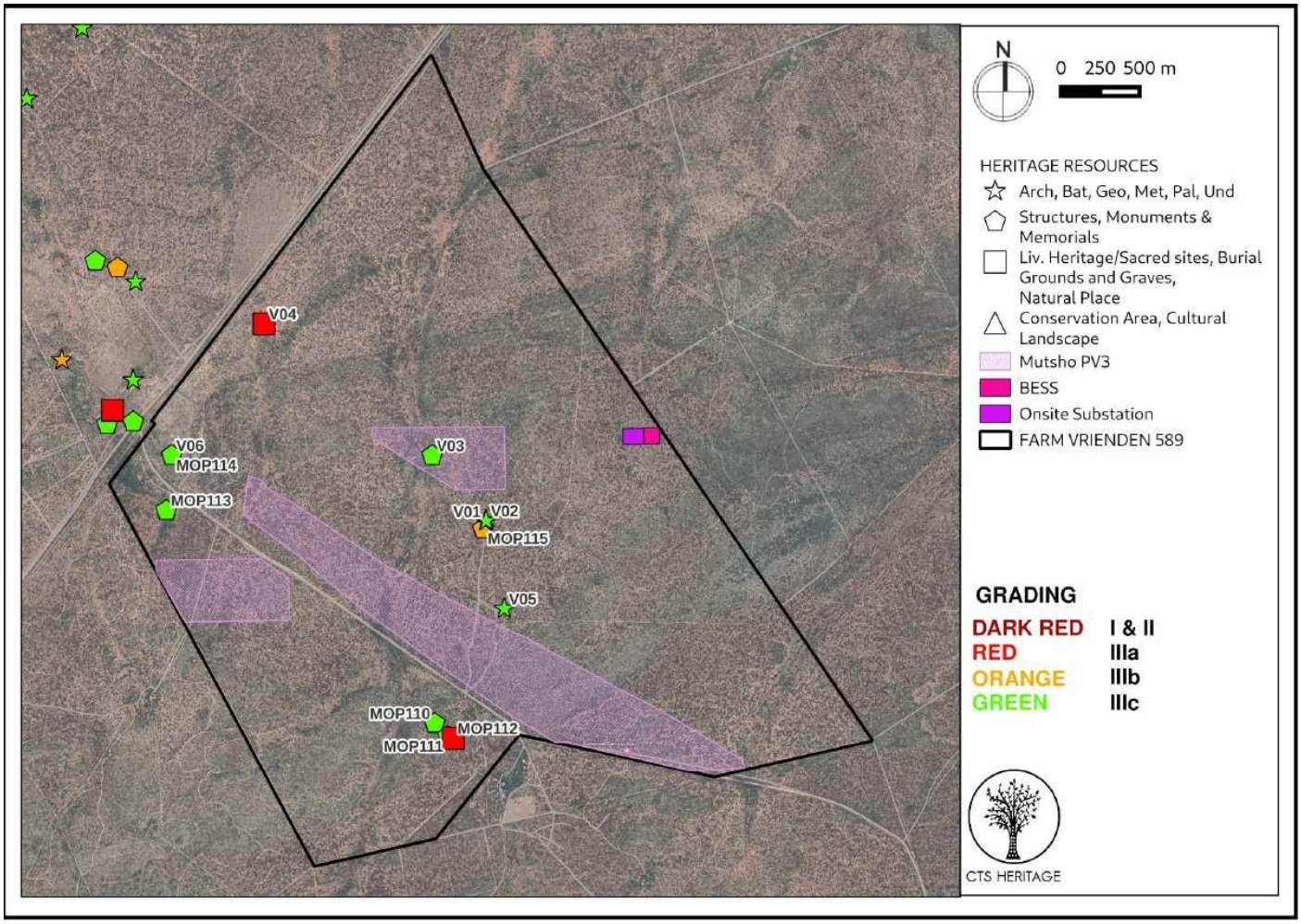


Figure 9.7: Map showing the all the significant heritage resources identified within the project site

Cultural Landscape

According to Silidi and Pikirayi (2013), "The coming of the Voortrekkers in the area and the introduction of commercial farming in the 19th and early 20th centuries has a strong archaeological footprint in the Mopane Project Area. We noted a prevalence of house remains associated with pioneer commercial farmers and shifting semi-permanent dwellings of farm workers. Several graves both with inscriptions and "anonymous" mostly associated with pioneer farmers or their workers were also recorded." No impacts to any historical farming infrastructure of houses are anticipated based on the information provided.

Broadly, the Project Area, which is approximately 70km from Mapungubwe, may be considered as part of the Greater Mapungubwe Cultural Landscape. Mapungubwe was once (between 900 and 1300 CE) the centre of gold and ivory trade with eastern African ports. It was South Africa's first kingdom, and developed into the subcontinent's largest realm, lasting for 400 years before it was abandoned in the 14th century. Its highly sophisticated people traded gold and ivory with China, India and Egypt. While the broader area of northern Limpopo can be considered to be part of the Greater Mapungubwe Cultural Landscape, the context of the area under assessment has been negatively impacted by the significant number of coal mines in the area.

Furthermore, the proposed PV facilities are located sufficiently far from the N1 (8km) that no impact to the way that this area is experienced is expected.

Given the visual absorption capacity (VAC) of the existing landscape, major impacts are likely to be limited to roads and homesteads in the immediate vicinity of the proposed development. There is also likely to be a small impact potentially extending to the limit of visibility of the tallest elements associated with the development.

The Visual Impact Assessment has confirmed that there are no major landscape and visual impacts that will preclude development. However, there are a number of localised impacts that could be experienced by residents of a small number of homesteads and users of local unsurfaced roads. If these are addressed through the mitigation measures indicated, there is no reason from a landscape and visual impact perspective why this project should not be authorised.

The impacts described above have been assessed in the VIA completed for this project and included in the EIA.

9.6.2 Description of the Heritage Impacts

The following impacts are expected from a heritage perspective:
» Destruction of archaeological heritage.
» Destruction of palaeontological heritage.

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

Construction Phase Impacts

Archaeology

Nature: *The construction phase of the project will require excavation, which may impact on archaeological heritage resources if present.* None of the heritage resources identified fall within the PV layout area provided and as such, no direct impact to any heritage resources is anticipated. However the heritage resources that were identified fall within close proximity to the layout provided and as such, it is important that impact to the significant sites is avoided. It is recommended that the sensitive heritage areas identified in this report are avoided by any proposed development of new infrastructure.		
	Without mitigation	**With mitigation**
Extent	Site (1) - Localised within the site boundary	Site (1) - Localised within the site boundary
Duration	Permanent (5) - Where an impact to a resource occurs, the impact will be permanent.	Permanent (5) - Where an impact to a resource occurs, the impact will be permanent.
Magnitude	Medium (3) - No archaeological heritage resources of significance were identified within the development footprint, however some were identified within the broader development area	Low (1) - No archaeological heritage resources of significance were identified within the development footprint, however some were identified within the broader development area

Probability	Probable (4) - It is possible that significant heritage resources will be impacted if the layout provided is followed	Very Improbable (1) - It is unlikely that significant heritage resources will be impacted if the layout provided is followed
Significance	**Low (24)**	**Low (7)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	Possible	Unlikely
Can impacts be mitigated?	Yes	

Mitigation:

» A 200m no-go buffer must be implemented around site V04
» A 100m no-go buffer must be implemented around sites MOP112 and MOP115
» Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

Residual Impacts:

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.

Palaeontology

Nature: *The construction phase of the project will require excavation, which may impact on palaeontological heritage resources if present.*

The area proposed for development is underlain by sediments of zero and moderate palaeontological sensitivity. Previous site visits and walk throughs have confirmed that there were NO FOSSILS in the project footprint.

	Without mitigation	**With mitigation**
Extent	Site (1) - Since the only possible fossils within the area would be microscopic blue-green algae in some stromatolites, the spatial scale will be localised within the site boundary.	Site (1) - Since the only possible fossils within the area would be microscopic blue-green algae in some stromatolites, the spatial scale will be localised within the site boundary.
Duration	Permanent (5) - Where an impact to resources occurs, the impact will be permanent.	Permanent (5) - Where an impact to resources occurs, the impact will be permanent.
Magnitude	Medium (3) - The area proposed for development is underlain by sediments of zero and moderate palaeontological sensitivity	Medium (3) - The area proposed for development is underlain by sediments of zero and moderate palaeontological sensitivity
Probability	Low (1) - The potential impact to fossil heritage resources is extremely low	Low (1) - The potential impact to fossil heritage resources is extremely low
Significance	**Low (9)**	**Low (9)**
Status (positive or negative)	Negative	Positive
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	Possible	Possible
Can impacts be mitigated?	Yes	

Mitigation:

- The Chance Fossil Finds Procedure must be implemented for the duration of construction activities:
  - Training:
    - Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.
  - Actions to be undertaken:
    - One person in the staff must be identified and appointed as responsible for the implementation of the protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material.
    - Once a workman notices possible fossil material, he/she should report this to the ECO or site agent. Procedure to follow if it is likely that the material identified is a fossil:
      - The ECO or site agent must ensure that all work ceases immediately in the vicinity of the area where the fossil or fossils have been found.
      - The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates.
      - The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find including:
        - The date.
        - A description of the discovery.
        - A description of the fossil and its extent (e.g., position and depth of find).
        - Where and how the find has been stored.
        - Photographs to accompany the preliminary report: (
          - ✓ A scale must be used.
          - ✓ Photos of location from several angles.
          - ✓ Photos of vertical section should be provided.
          - ✓ Digital images of hole showing vertical section (side).
          - ✓ Digital images of fossil or fossils.
    - Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.
    - Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sand bags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation.
    - If the find cannot be stabilised, the fossil may be collect with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove the all fossil material and any breakage of fossil material must be avoided at all costs.
    - No work may continue in the vicinity of the find until SAHRA has indicated, in writing, that it is appropriate to proceed.

Residual Impacts:

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

9.6.4 Overall Result

The current and past heritage assessments of this property have identified limited heritage resources of cultural value. A previous assessment identified Farm Vrienden 589 as preferred for development with limited impacts to heritage resources anticipated as its overall heritage sensitivity is regarded as LOW overall. The most significant site identified in the vicinity of the development is Site V04. It is recommended that Site V04, the Baobab Room, must not be impacted by any activity and any proposed activity on this farm must adhere to a buffer area of 100m around this site. This site is located a significant distance from the area proposed for development.

The PIA notes that "The scarcity of fossil heritage at the proposed development footprint indicate that the impact of the (of the development) will be of a low significance in palaeontological terms. Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources."

In light of these findings, there is no objection to the proposed development on heritage grounds on condition that the recommendations outlined below are adhered to.

Based on the outcomes of the Heritage Impact Assessment, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that:

- The recommendations in the VIA are implemented.
- A 200m no-go buffer must be implemented around site V04.
- A 100m no-go buffer must be implemented around sites MOP112 and MOP115
- The Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- Should any buried archaeological resources or human remain or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

9.7. Assessment of Visual Impacts

Negative impacts on visual receptors within close proximity of the project site will occur during the undertaking of construction activities and the operation of Mutsho Solar PV3. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H**).

9.7.1 Results of the Visual Impact Assessment

Site Sensitivity

The following sensitivities have been identified from a visual perspective (refer to **Figure 9.8**):

- Highly sensitive areas include:
    - Areas immediately surrounding homesteads development of which is likely to significantly change the character of views for residents and guests. A 500m buffer is proposed which should be sufficient to ensure that development does not totally dominate views. It is possible that receptors (owners /residents / guests) have no concern regarding the development of these areas, in which case the sensitivity rating will reduce.

Note: The difference in the proposed buffer width reflects the relatively high importance of permanent views for residents from homesteads relative to transient views of travellers from roads.

- Medium sensitivity areas include:
  - Corridors beside the roads that could be affected. Due to distance, the main roads that run through the area are unlikely to be significantly impacted. As indicated in previously, given that local unsurfaced roads are likely to provide access to local lodges, these also have tourism importance.

- Low sensitivity areas include:
  - All other areas of the proposed site.

Overlaying the footprint of the proposed project onto the Sensitivity Map (refer to **Figure 9.8**), it is obvious that the project falls entirely within the Low Sensitivity zone.

Zones of Theoretical Visibility

Zones of Theoretical Visibility (ZTV) are defined as "a map usually digitally produced showing areas of land within which a development is theoretically visible". ZVTs for the proposed development have been assessed using Global Mapper GIS.

The PV layout ZTV assessment indicates the following:

- The proposed array and the substation are likely to be visible over similar extents.
- Views of the proposed array and the substation will be constrained to the north east and south west by minor ridgelines with the development likely to be most visible to the north where it may be visible for up to 7km.
- The project will not be visible from protected areas.
- The project will not be visible from the N1.
- The project may be visible from approximately 13.5km of the railway as well as the unsurfaced road that runs parallel to it.
- The project may be visible from approximately 2.8km of the unsurfaced road that runs through the affected property.
- The ZTV analysis indicates that the proposed project could be visible from thirteen homesteads within 2km.

Glare

Areas that could be affected by glare include:

- The unsurfaced road that runs parallel and adjacent to the railway; and
- The unsurfaced road that runs through the property.

The main sensitive receptor being road users of the N1, is highly unlikely to be affected due to distance the extent of vegetation and the fact that the site is approximately 10 – 20m higher than the N1 at its closest point.

Due to the extent of existing vegetation surrounding the proposed array, it is highly unlikely that glare will be problematic. However, if clearing of vegetation without consideration of glare should be undertaken then it's possible that the situation could change. The most likely areas that could be affected are the adjacent local roads.

9.7.2 Description of Visual Impacts

The following list of possible impacts have been identified;

- The proposed development could change the character and sense of place of the landscape setting;
- The proposed development could change the character of the landscape as seen from the local roads;
- The proposed development could change the character of the landscape as seen from local agricultural homesteads;
- The proposed development could change the character of the landscape as seen from private nature reserves;
- Glare impacts; and
- Lighting impacts.

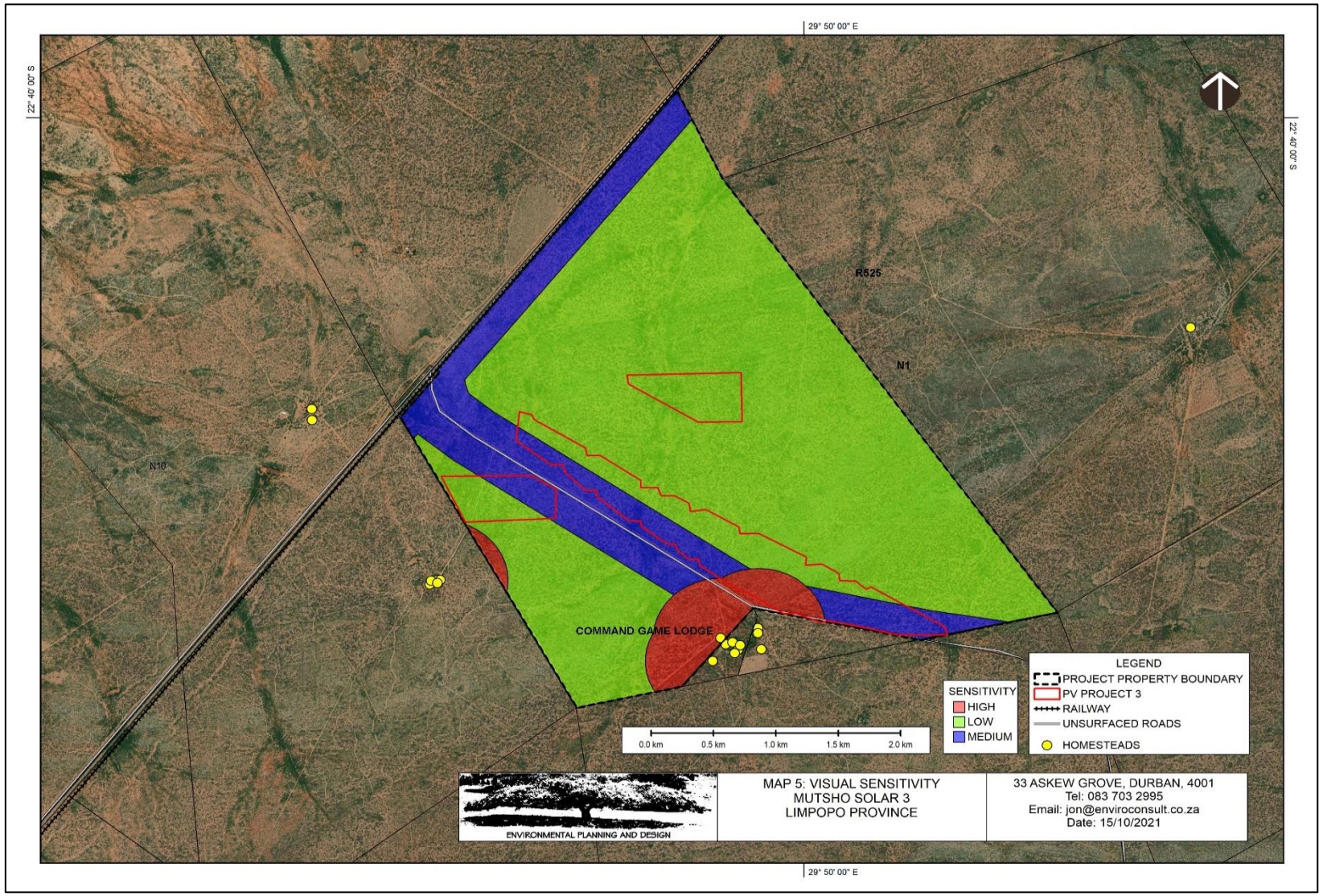


Figure 9.8: Visual sensitivities identified within the project site

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

Construction, Operation and Decommissioning Phase Impacts

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

The proposed development could negatively impact on the character of the Undulating Plain LCA which is largely a natural landscape which may be an important tourism resource.
Due to the extent of natural vegetation and the gently undulating plain with rocky ridgelines the affected landscape has a relatively cohesive natural character that is valuable for local tourism activities.

This main impact relates to industrialisation of the rural landscape surrounding the proposed site. This will occur if views of the proposed solar array and associated infrastructure become visible and obvious from areas that are currently natural in character.

Given the VAC of the existing landscape, major impacts are likely to be limited to roads and homesteads in the immediate vicinity of the proposed development. There is also likely to be a small impact potentially extending to the limit of visibility of the tallest elements associated with the development.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long Term (4)
Magnitude	Low (4)	Small (0)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (12)**
Status (positive or negative)	If the development is visible from adjacent local roads it is likely that a proportion of receptors will see the proposed development in a negative light. **Negative**	If the proposed development is not visible from local roads then receptors are unlikely to think of the proposed development in a negative light. **Neutral**
Reversibility	High	High
Irreplaceable loss of resources?	The landscape character of the proposed site is relatively common within the region. It would also be possible to dismantle the proposed project and rehabilitate the site. Whilst this is unlikely in the short to medium term it does mean that **there will therefore be no irreplaceable loss.**	**No irreplaceable loss**
Can impacts be mitigated?	Yes	

Mitigation/Management:

Planning:

- Plan to maintain the height of structures as low as possible.
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.
- Plan to maintain and augment a buffer of existing forest around the development sufficient to screen views from adjacent local roads and prevent glare issues.

Construction:

- Minimise disturbance and loss of existing vegetation.
- Undertake rehabilitation of disturbed areas.
- Undertake screen planting.

Operations:
» Monitor rehabilitated areas and implement remedial actions (monthly until establishment, thereafter at the middle and end of every growing season).
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:
» Remove infrastructure not required for the post-decommissioning use of the site.
» Return all possible areas to their original state.
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:
The residual risk relates to loss of natural landscape being obvious on decommissioning of the proposed project. In order to minimise this impact, it is critical that existing natural landscape areas in and around the development are maintained and protected and that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *The proposed development could be visible from and impact negatively on tourist routes in the area*

The proposed project will not be visible from either the N1 or the R525. It will, however be visible from both the unsurfaced roads that run through the affected property and adjacent to the railway to the north.

Currently, these views are largely screened by existing vegetation.

	Without mitigation	**With mitigation**
Extent	Local Roads Local **(2)**	Local Roads Local **(2)**
Duration	Local Roads Long term **(4)**	Local Roads Long term **(4)**
Magnitude	Local Roads High **(8)**	Local Roads Minor **(2)**
Probability	Local Roads Definite **(5)**	Local Roads Probable **(3)**
Significance	Local Roads High **(70)**	Local Roads Low **(24)**
Status (positive or negative)	Local Roads **Negative**	Local Roads If sufficient forest is retained / augmented to screen the project from local roads it is unlikely that they will be considered as having a negative impact. **Negative / Neutral**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation/Management:
Planning:
» Plan to maintain the height of structures as low as possible.
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.
» Plan to maintain and augment a buffer of existing forest around the development sufficient to screen views from adjacent local roads.

Construction:
» Minimise disturbance and loss of existing vegetation.
» Undertake rehabilitation of disturbed areas.

» Undertake screen planting.

Operations:

» Monitor rehabilitated areas and implement remedial actions (monthly until establishment, thereafter at the middle and end of every growing season).
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site.
» Return all possible areas to their original state.
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:

The residual risk relates to loss of rural landscape being obvious on decommissioning of the proposed project. In order to minimise this impact, it is critical that existing natural landscape areas in and around the development are maintained and protected and that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *The proposed development could impact on tourist's views from trains*

The proposed development is likely to be highly obvious from trains as they pass through the area. However because the railway is not likely to carry any significant number of tourists, the probability of impacts is relatively low.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (24)**	**Low (20)**
Status	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation/Management:

Planning:

» Plan to maintain the height of structures as low as possible.
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.
» Plan to maintain and augment a buffer of existing forest around the development sufficient to screen views from adjacent railway.

Construction:

» Minimise disturbance and loss of existing vegetation.
» Undertake rehabilitation of disturbed areas.
» Undertake screen planting.

Operations:

» Monitor rehabilitated areas and implement remedial actions (monthly until establishment, thereafter at the middle and end of every growing season).
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site.
» Return all possible areas to their original state.
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:
The residual risk relates to loss of rural landscape being obvious on decommissioning of the proposed project. In order to minimise this impact, it is critical that existing natural landscape areas in and around the development are maintained and protected and that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *Industrialisation of Views from Homesteads and recreational / local tourism facilities*

Homesteads and recreational / local tourism facilities are assessed together because both are point receptors and it is likely that some farms in the area have a secondary or primary tourism use.

Due to the high level of VAC of the landscape, the majority of properties that are indicated as being affected by the ZTV analysis and within the approximate limit of visibility of the various elements are unlikely to be affected.

The closest is likely to be Command Game Farm and Lodge which is immediately adjacent to the project property.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (7)	Small (0)
Probability	Probable (3)	Very Improbable (1)
Significance	**Medium (39)**	**Low (6)**
Status	It is likely that the closest residents and business owners that are affected will see the development in a negative light. **Negative**	**Neutral**
Reversibility	Low	Low
Irreplaceable loss	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation/Management:

Planning:

» Plan to maintain the height of structures as low as possible.
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.
» Plan to maintain and augment a buffer of existing forest around the development sufficient to screen views from adjacent railway.

Construction:

» Minimise disturbance and loss of existing vegetation.
» Undertake rehabilitation of disturbed areas.
» Undertake screen planting.

Operations:

» Monitor rehabilitated areas and implement remedial actions (monthly until establishment, thereafter at the middle and end of every growing season).
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site.
» Return all possible areas to their original state.
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:

The residual risk relates to loss of natural landscape being obvious on decommissioning of the proposed project. In order to minimise this impact, it is critical that existing natural landscape areas in and around the development are maintained and protected and that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

Nature: *Lighting impacts*

The area is currently relatively dark at night with relatively low level light sources generally being located at each local homestead and at each house within the settlement of Mopane.

Lighting on the project is likely to include:
» Operational lighting will be required at buildings;
» Floodlighting could be required for key operational areas including the sub-station. This may be required to ensure that maintenance work can be undertaken during hours of darkness; and
» Security lighting is likely to be required. This may be high mast lighting or boundary lighting along the fence line.

The largest risk of nuisance is likely to be associated with flood lit areas, boundary security lighting and high mast lighting.

Receptors at greatest risk of impact includes the closest homesteads.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor to Small, (1)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (14)**
Status	Night-time lighting affecting homesteads particularly those involved with tourism is likely to be considered as a negative impact. **Negative**	If lights are visible but are at the same level as other homesteads, then lighting is unlikely to be considered as a negative impact. **Neutral**
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation/Management:

High lighting levels can be mitigated by:
» Minimising lighting of the facility as far as possible.
» The use of sensors to ensure that when there is no one present, lighting automatically switches off.
» Careful choice of external fittings to ensure that light is focused on relevant areas and does not spill into un-necessary areas.
» Shielding of all external lights.

Security / Maintenance lighting can be mitigated by:
» The use of infra-red technology for security purposes.
» Ensuring that maintenance is scheduled for daylight hours where possible.
» Where maintenance may be required during the hours of darkness lighting should only be activated only for the areas required.
» Ensure that all lighting is focused on the area of interest and that light spill is minimised.
» Using light shields to minimise light spill.

Residual Impacts: No residual risk has been identified.

Nature: *Glare Impacts*

Due to distance and the fact that the project is significantly higher, the N1 is highly unlikely to be affected by glare created by the proposed array.

It is possible that adjacent un-surfaced roads could be affected by glare. However, these roads are low speed and are not highly trafficked.

If a sufficient buffer of forest vegetation remains between the roads and the proposed array this will screen any potential glare

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings (2)	Site and immediate surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Small (0)
Probability	Improbable (2)	Very Improbable (1)
Significance	**Medium (20)**	**Low (6)**
Status	Negative	Neutral
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

» Plan to maintain the height of structures as low as possible.
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.
» Plan to maintain and augment a buffer of existing forest around the development sufficient to screen views from adjacent railway.

Construction:

» Minimise disturbance and loss of existing vegetation.
» Undertake rehabilitation of disturbed areas.
» Undertake screen planting.

Operations:

» Monitor rehabilitated areas and implement remedial actions (monthly until establishment, thereafter at the middle and end of every growing season).
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
» Trackers can be programmed to prevent reflection towards affected sections of roads.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site.
» Return all possible areas to their original state.
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Residual Impacts:
There are no residual risks.

9.7.4 Overall Result

It was determined that the potential visual impacts would be:

- The impact on the landscape in the area was assessed as having an impact of low significance with mitigation.
- The impact relating to views from local main roads was assessed as having a low significance after mitigation.
- The impact relating to tourist views from trains was assessed as having a low significance after mitigation.
- The impact relating to views from homesteads and recreational/local tourism facilities was assessed as having a medium negative significance without mitigation and a low significance after mitigation.
- The impact relating to lighting (security and operational lighting) was assessed as likely to have low significance with mitigation.
- The impact relating to glare will be of low significance with appropriate mitigation.

The proposed project will generally result in landscape and visual impacts of low to high significance. Subject to mitigation measures being undertaken, mitigation measures arising and the recommended mitigation measures, from a Landscape and Visual Impact perspective, it is the specialist's opinion that there is no reason why the proposed layout should not be authorised.

9.8. Assessment of Socio-economic Impacts

Various positive and negative impacts have been identified with the development of Mutsho Solar PV3 from a socio-economic perspective. Potential social impacts and the relative significance of the impacts associated with the development of Mutsho Solar PV3 are summarised below (refer to **Appendix I**).

9.8.1 Results of the Socio-economic Impact Assessment

The development of renewable energy is strongly supported at a national, provincial, and local level. The development of and investment in renewable energy is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all refer to and support renewable energy. The Limpopo Employment, Growth & Development Path, the Vhembe District Municipality Integrated Development Plan (IDP) and the Govan Mbeki and Musina Local Municipality IDP also support the development of renewable energy. The development of the proposed solar facility is therefore supported by key policy and planning documents.

The land portions on which the Project will be located are currently used for commercial tourism, such as trophy hunting and game breeding (predominant use), however, one landowner indicated that they also use the farm for commercial agriculture purposes, such as livestock farming. The majority of trophy hunters in the area is local, with an average of 10-15 visitors each year, followed by international hunters (4-6 visitors per year).

From the data obtained from surveyed landowners, it is concluded the majority farms in the area practice a combination of commercial tourism (trophy hunting) and livestock activity. As such, most farms are involved in both land uses as indicated previously. The following observations were made regarding land use:

- Majority of the farmers are commercial farmers (tourism and agriculture)
- Game breeding of approximately 250 animals take place on one of the farms, whereas the livestock farmer indicated 20 animals (goats and sheep)

» The size of the commercial tourism property is 1 319 ha and the commercial agriculture 130 ha.
» The commercial tourism farmer lives on the farm with his wife, whereas the commercial agricultural farmer has 1 person residing on the farm, renting the house.

Given the number of responses received from owners in the area, it has not been possible through primary research to estimate the total contribution of the agricultural industry to the local economy. One landowner specifically mentioned that he will not be able to continue with his commercial tourism operations due to the sense of place being affect by the planned infrastructure.

The direct or immediate socio-economic Area of Impact (AOI) of the proposed project is indicated in **Figure 9.9**. The majority of the direct AOI covers bushveld (game farms), with very few buildings. There are two sites identified where buildings are situated, it is still to be confirmed if it is permanent residents or only store facilities. The map also indicates the infrastructure of the project, it is clear that the two existing buildings are avoided.

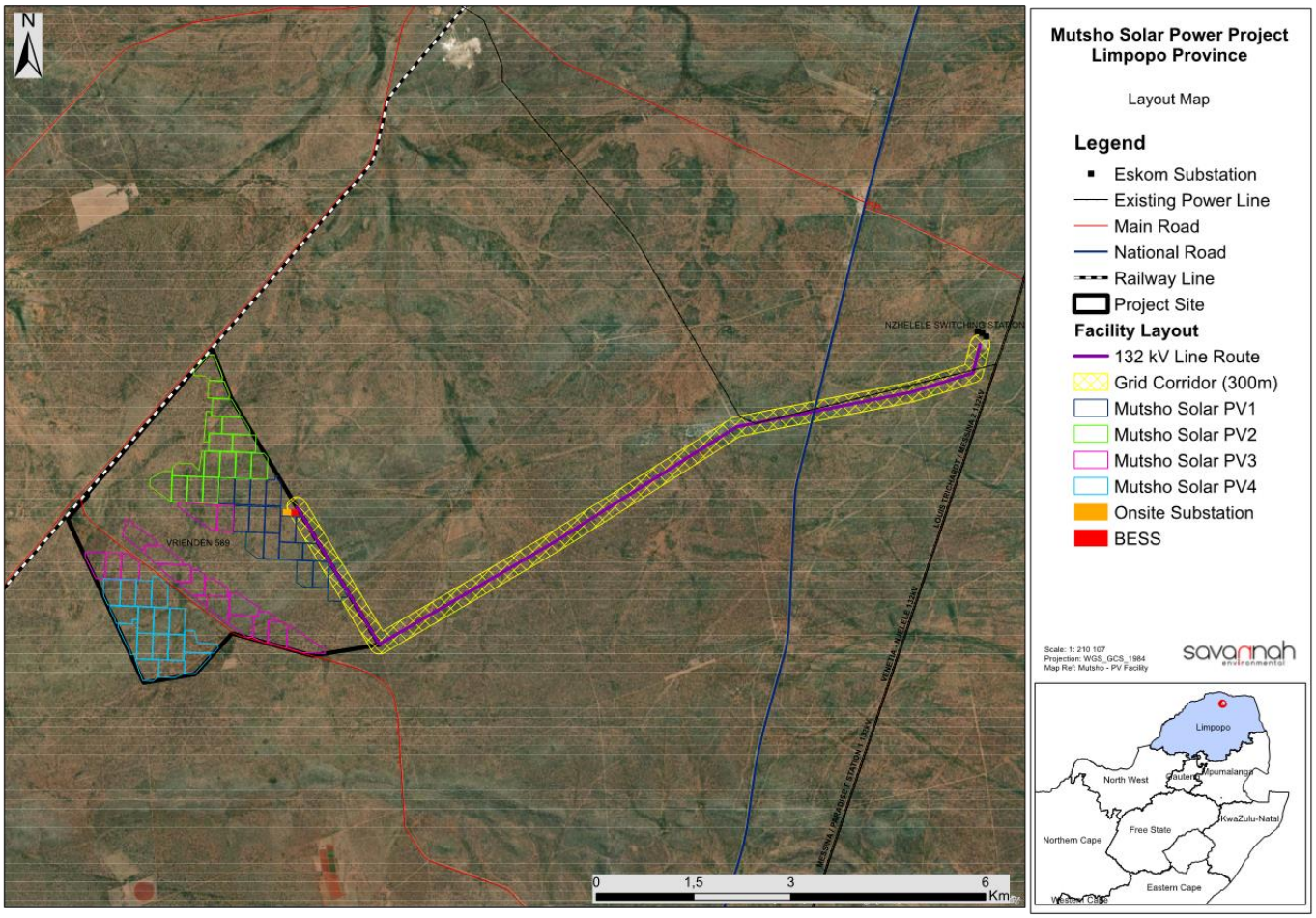


Figure 9.9: AOI and Zone of Influence

9.8.2 Description of Social Impacts

Impacts are expected to occur with the development of Mutsho Solar PV3 during the construction, operation and decommissioning phases. Both positive and negative impacts are identified and assessed.

Impacts during construction include:
» Impact on production.
» Impact on the Gross Domestic Product (GDP).
» Impact on employment creation.
» Skills development.
» Household income and standard living.
» Temporary increase in government revenue.
» Change in sense of place.
» Impact on agricultural operations
» Influx of people.
» Impact on economic and social infrastructure

Impacts during the operation phase include:
» Impact on production.
» Impact on the GDP.
» Employment creation.
» Household income and standard of living.
» Increase in government revenue.
» Rental revenue for landowners.
» Improvement in energy sector generation.
» Visual and sense of place impacts.
» Impacts on agricultural operations.

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

Construction Phase Impacts

Nature: *Expenditure associated with the construction of the proposed 100MW Solar PV will impact on the production of the local economy*

The proposed PV Facility will cost R 1.43 billion (2022 prices) to establish. This will equate to a total impact of R 5.83 billion (direct, indirect, and induced) on production/new business sales in the country. The localised expenditure on the project will stimulate the local and national economies albeit for a temporary period of 24 months during construction.

	Without enhancement	**With enhancement**
Extent	National (4)	National (4)
Duration	Short-term (1)	Short-term (1)
Magnitude	High (8)	High (8)
Probability	Definite (5)	Highly probable (5)
Significance	**High (65)**	**High (65)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes (enhance)	Yes

Enhancement:
» The project developer should use locally sourced inputs where feasible in order to maximize the benefit to the local economy.
» Sub-contracting of local construction companies to occur as far as possible for the construction of facilities.

Residual Impact:
Short term Economic injection into the local and regional economy.

Nature: *Temporary increase in country's GDP due to capital expenditure during the construction period*

It is estimated that the project will increase the GDP directly in the country by R 409.4 million in 2022 prices, which will translate into a total impact of R 1.67 billion (direct, indirect, and induced) of Gross Domestic Product (GDP). These effects will take place for the duration of construction.

The greatest effects on production and GDP stimulated during construction activities will be created through the multiplier effects, specifically through a combination of production and consumption induced effects. The former refers to the impact generated along backwards linkages when the project creates demand for goods and services required for construction and subsequently stimulates the business sales of the suppliers of inputs that are required to produce these goods and services. The latter refers to the effects of household spending which is derived from an increase in salaries and wages directly and indirectly stimulated by the project's expenditure.

Sectors and industries that will experience the greatest stimulus from this expenditure include:
- Basic metals, structural metal products and other fabricated metal products industries
- Trade
- Insurance
- Transport services
- Electrical machinery and apparatus

	Without enhancement	**With enhancement**
Extent	National (4)	National (4)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**Medium (55)**	**Medium (55)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes (enhance)	Yes

Enhancement:
- The project developer should use locally sourced inputs where feasible in order to maximize the benefit to the local economy.

Residual Impact:
Short term Economic injection into the local and regional economy.

Nature: *The construction of the 100MW Solar PV Facility will positively impact the community and beyond by creating a number of job opportunities (albeit temporary)*

The construction of the facility will create 400 Full Time Equivalent (FTE) employment positions over the course of the development. The total number of jobs that will be created is estimated to 1 629 (including direct, indirect and induced). Given the size of the construction sector within the municipality, it is anticipated that there will be sufficient local labour to satisfy the demand for 400 South African based construction workers. Furthermore, if most of the local staff comes from the Local Municipality it will have a positive effect on local unemployment.

Beyond the direct employment opportunities that will be created by the project during the construction phase the development will also have a positive spin-off effect on the employment situation in other sectors of the national and

local economies. Through the procurement of local goods (i.e., consumption induced effects) the project will support an estimated total of 699 FTE employment positions (indirect). Most of these positions will be in sectors such as construction, business services and trade. The expenditure on the project outside of the local economies will also have a positive effect on employment creation, albeit for a temporary period of 24 months.

Through the production and consumption induced impacts the project is envisioned to create an estimated additional 530 FTE employment (induced) positions. Given that a significant portion of the multiplier effects will be generated through backward linkages, more than half of these FTE employment positions will be created along the supply chain and amongst industries providing inputs to the businesses in the supply chain. Throughout the construction phase it is recommended that the developer encourage the EPC contractor to fill as many local positions as possible using labour from within the Local Municipality rather than from outside of the municipal boundaries.

	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**Medium (50)**	**Medium (50)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes (enhance)	Yes

Enhancement:

» Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for.
» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.

Residual Impact:
No residual impacts are applicable.

Nature: *Employees will develop and enhance skills thereby increasing experience and knowledge*

The construction of the proposed facility is likely to have a positive impact on the skills development in South Africa. During the solar panel component assembly and structure manufacturing period which is included as part of the construction phase and is planned to be conducted in Limpopo, it is likely that foreign technical experts will be involved. This will present an opportunity for skills and knowledge transfer between these technical experts and local manufacturers. It is also expected that the construction staff involved in the project will gain knowledge and experience in respect of the development of solar energy facilities.

More skilled local construction staff would most likely also lower the cost of future solar projects in the province. In addition to the direct effects of the project on skills development in the country and the local economy, the project could contribute to the development of the local research and development (R&D) and manufacturing industries associated with solar technology.

	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Moderate (5)
Probability	Definite (5)	Definite (5)
Significance	**Medium (60)**	**High (65)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No

Can impacts be enhanced?	Yes (enhance)	Yes
Enhancement: » In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience. » Facilitate the transfer of knowledge between experienced employees and the staff. » Perform a skills audit to determine the potential skills that could be sourced in the area.		
Residual Impact: Skills developed during the project can be utilised in future.		

Nature: *Employed individuals will increase the income of their respective households and thereby experience an improvement in their standard of living*

The proposed Project will create an estimated total of 1 629 South African based FTE employment positions during construction generating R 795.2 million of revenue for the affected households in the country through direct, indirect, and induced effects. Of this figure R 195.3 million will be paid out in the form of salaries and wages to those individuals directly employed during the construction phase. The remaining R 599.9 million in households' earnings will be generated through indirect and induced effects resulting from project expenditure. Although temporary, this increase in household earnings will have a positive effect on the standard of living for these households. This is especially applicable to the households benefitting from the project that reside in the Local Municipality and broader Limpopo.

	Without enhancement	**With enhancement**
Extent	Regional (3)	Regional (3)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**Medium (50)**	**Medium (50)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes (enhance)	Yes
Enhancement: » Local employment will benefit local households and the local area.		
Residual Impacts: No residual impacts are applicable.		

Nature: *The investment in the facility will generate revenue for the government during the construction period through a combination of personal income tax, VAT, companies' tax etc*

The investment in the Project will generate revenue for the government during the construction period through a combination of personal income tax, VAT, companies' tax etc. Additional government revenue will also be earned through corporate income tax, however since the gross operating surplus of the EPC contractor employed to construct the facility is not known, an estimate of the overall corporate income tax value is not possible at this stage. Government earnings will be distributed by national government to cover public spending which includes amongst others the provision and maintenance of transport infrastructure, health, and education services as well as other public goods.

	Without enhancement	**With enhancement**
Extent	Local (2)	Local (2)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)

Significance	**Medium (36)**	**Medium (36)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	No	No
Enhancement: » No enhancement measures are required.		
Residual Impacts: No residual impacts are applicable.		

Nature: *Sense of place impacts (visual, noise and dust)*		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**Medium (50)**	**Medium (40)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction » Install screens around the construction site to reduce the visual impact of construction on surrounding properties » Site watering (or use of appropriate dust suppressant) from time to time to reduce dust emitting from the construction site		
Residual Impacts: No residual impacts are applicable.		

Nature: *The negative impact on the sense of place will have a negative financial effect on the tourism business on the farm*

As construction begins at the proposed site, disturbances will likely be minimal. The presence of construction machinery, increased traffic to and from the site (transporting staff, equipment, and material) and staff on or near the site will likely be the largest disturbances.

The longer construction continues, the greater the disturbances will likely be. As the panels and infrastructure are erected there is likely to be an increased disturbance as panels and structures become increasingly visible in the surrounding area. Once construction is completed the disturbances associated with the vehicular traffic, equipment and staff will be reduced and the remaining disturbance will be that of the solar farm itself. According to the landowner's survey's one landowner mentioned that "the allure for the eco-tourist or hunter is to experience the unspoilt natural beauty, solitude and animal life of the area. Noise and light pollution will make this impossible. The unspoilt skyline and remoteness are what an African experience is all about.

These projects should be developed close to existing towns e.g., Musina or Makhado where the natural beauty has been impacted already. I would not be able to continue economic activities if this were to happen. There is no alternative farming activity as rainfall is too low and water is scarce".

	Without mitigation	**With mitigation**

Extent	Local (1)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Highly probable (4)
Significance	**Medium (40)**	**Medium (32)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
» Construct the solar panels on parts where the least arable land will be affected.		
Residual Impacts:		
No residual impacts are applicable.		

Nature: *An impact on the demographics of the area as a result of in-migration in response to job opportunities will occur.*

Neither the local nor the surrounding municipalities are sufficiently diversified to supply the entire workforce for the construction of the proposed Project, particularly in terms of skilled positions. A significant number of the unskilled and semi-skilled workers required during the construction phase will however be sourced locally. In addition, given the scale and extent of the development, the project is likely to attract job seekers from other parts of the country, particularly from within Limpopo and Gauteng. This would be in addition to the migrant workers contracted to work on the project. The migration of people to the area could result in social conflicts between the local population and the migrant work force as the local population could perceive these migrant workers as "stealing" their employment opportunities. Likewise, the influx of people into the area, could potentially lead to a temporary increase in the level of crime, illicit activity and possibly a deterioration of the health of the local community through the spread of infectious diseases. Semi-skilled and unskilled construction workers could also choose to remain in the area following the completion of the construction phase. Without any form of income these individuals run the risk of exacerbating the level of poverty within the Local Municipality.

Aside from the broader community issues the increase in the number of people in the area is likely to have an adverse effect on crime levels, incidents of trespassing, development of informal trading and littering. There is also potentially a likelihood of increased stock theft. The influx of job seekers and the potential social conflicts that can arise with in-migration of temporary workers to an area is difficult to mitigate.

Appropriate awareness campaigns and strict adherence to recruiting practices could, however, reduce the extent of the adverse effect. Addressing the challenges related to potential social impacts is best done in partnership with all stakeholders in the area, specifically the affected and adjacent property owners, local communities, ward communities and municipalities. This would promote transparency; information sharing and help build good relationships between all affected parties. In addition, all opportunities that would include the community in the project should be explored and where possible implemented. Employment opportunities, including the provision of ancillary services, are particularly relevant in this incidence as the creation of employment opportunities for locals could eliminate the potential alienation between the community and the project as well as migrant workers.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Low (18)**
Status (positive or negative)	Negative	Negative

Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration.
» Train unemployed local community members with insufficient skills and increase absorption of local labour thereby decreasing in-migration.

Residual Impacts:
Workers remaining after the construction period without work will put strain on public resources.

Nature: *An increase in traffic due to construction vehicles and heavy vehicles could create short-term disruptions and safety hazards for current road users*

The proposed solar PV Facility will create and estimated 400 FTE employment positions (South African based positions) for the duration of the project. Given that these workers will require services there is likely to be an increase in the demand for social services, access to water and electricity. Given the proximity of the development site to Musina, it is most likely that the health facilities in the area will experience additional demand for medical services brought about by the influx of job seekers.

These connections will, however, be minimal and it is unlikely to alter the demand significantly. The effects of the project on road infrastructure should also be considered as it is highly likely that the development will lead to an increase in traffic volumes on surrounding roads. The deterioration of these roads could place additional financial burdens on the municipality through additional maintenance costs. Additional traffic volumes are also likely to impact the condition of secondary roads used to access surrounding farms. The transport study will confirm the impact on roads for the Project.

Based on the above discussion it is expected that the basic service provision, health facilities and road infrastructure will be under additional strain during the construction period. Given that the project is anticipated to attract additional people to the area the significance of the impact is considered to be medium. These impacts can however be mitigated if the developer engages with the local municipalities and plans accordingly.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

» Provide public transportation service for workers in order to reduce congestion on roads.
» Partner with local municipalities and other prominent users of the local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the planned construction activities.
» Transportation contractors must adhere to the road rules and regulations.
» Utilise only designated access routes & entrance/exits from the site.
» Implement appropriate signage & road safety measures at entrance/exit to the site and on site.

Residual Impacts:
No residual impacts are applicable.

Operation Phase Impacts

Nature: *Expenditure associated with the operation of the proposed Solar PV Facility will have a positive impact on production*

The proposed facility will require an annual operational expenditure of R 18.1 million over 20 years. The total impact on production in the country as a result of the project's operations will equate to R 48.8 million per annum in 2022 prices for the 20 years. Aside from the utilities sector, industries that will experience the greatest stimulus from the project will include electrical machinery and apparatus, insurance, trade, transport service and chemical production industry. It is estimated that the project will generate R 26.6 million of value add per year over the 20-year period (comprising gross operating surplus before taxes and labour) and taxes. The production and consumption induced multiplier effects of the project are considered to be relatively small compared to conventional electricity generating industries.

This is because the energy source used to produce electricity by the proposed solar energy facility is free, unlike conventional power stations where raw inputs (i.e., coal) and the transport thereof comprise a significant portion of operating expenditure. It is for this reason that such a facility is a highly attractive business venture.

	Without enhancement	**With enhancement**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low(4)
Probability	Definite (5)	Definite (5)
Significance	**Medium (50)**	**Medium (50)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes (enhance)	Yes

Enhancement:

» The project developer should make effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.
» Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.

Residual Impacts:

No residual impacts are applicable.

Nature: *Positive impact on GDP due to operating expenditure during operations*

In addition to the positive production and GDP impacts arising from expenditure related to the operation of the facility, the local economy is anticipated to be positively stimulated by expenditure related to the developer's intended socio-economic development contributions in the immediate area. The contribution to the Local Municipality, although small relative to the combined size of the municipality's economy, will nevertheless be positive and more importantly, a sustainable contribution.

	Without enhancement	**With enhancement**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (40)**	**Medium (40)**
Status (positive or negative)	Positive	Positive

Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes (enhance)	Yes

Enhancement:

» The project developer is to make an effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.

» Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.

Residual Impacts:

No residual impacts are applicable.

Nature: *The Solar PV Facility will create additional employment due to maintenance of the solar panels*

The proposed Project will create an estimated 10 permanent employment positions across the operation phase of the development which, will be retained for approximately 20 years. Of these, an estimated 10 will be South African based positions. It is envisaged that some of the skilled and low skilled staff will be employed from within the local area with the remaining staff being sourced from other parts of Limpopo and the country. Aside from the direct employment opportunities, the facility will support an estimated 27 FTE employment positions created through the production and consumption induced effects.

Due to the spatial allocation of procurement spending and direct employment created, most of the indirect and induced positions will also be created within the local area. The trade, agriculture and community and personal services sectors will benefit the most from these new employment opportunities.

	Without enhancement	**With enhancement**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Low (28)**	**Low (28)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes (enhance)	Yes

Enhancement:

» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.

Residual Impacts:

No residual impacts are applicable.

Nature: *Employed individuals will increase the income of their respective households and therefore improve their standard of living*

The creation of an estimated 10 FTE employment positions throughout the country will generate R 3.0 million of personal income (2022 prices), which will be sustained for the entire duration of the Project's lifespan. Given the average household size in affected local municipalities and nationally, this increase in household earnings will support several people. The sustainable income generated as a result of the Project's operation will positively affect the standard of living of all benefitting households. This is specifically applicable to the Local Municipality, as the average income per employee at the facility would far exceed the average household income within these municipalities.

Skills development coupled with sustainable employment creation opportunities as a result of the Developer's intended SED spend, are expected to contribute towards an improved standard of living amongst families that might not have had a sustainable income previously.		
	Without enhancement	**With enhancement**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (32)**	**Medium (32)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes (enhance)	Yes
Enhancement: » Employing locally will increase benefit to local households and the local area.		
Residual Impacts: No residual impacts are applicable.		

Nature: *Government revenue will be derived from the proposed development*

The proposed Project will, through property taxes and salaries and wages payments, contribute towards both local and national government revenue. At a local level, the Project will contribute to local government through payments for utilities used in the operation of the Project. It will also increase its revenue through an increase in property taxes compared to the current level. Given that the Local Municipality has a relatively small economy, any additional income would greatly benefit the Municipality.

On a national level, the revenue derived by the Project during its operations, as well as the payment of salaries and wages to permanent employees will contribute to the national fiscus. Although it is impossible to trace exactly how such revenue is allocated, any additional revenue generated means that national governments can increase its spending on public goods and services.

	Without enhancement	**With enhancement**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (40)**	**Medium (40)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	No	No
Enhancement: » No enhancement measures are required.		
Residual Impacts: No residual impacts are applicable.		

Nature: *Increase in revenue due to rental paid for landowners where the solar panels will be located*		
	Without enhancement	**With enhancement**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)

Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (40)**	**Medium (40)**
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	No	No
Enhancement: » No enhancement measures are required.		
Residual Impacts: No residual impacts are applicable.		

Nature: *Improved energy security and energy sector will result due to the development of the solar farm*

The development of the solar farm will lead to a sustainable increase in the supply of electricity for the country. It was noted in Section 3 that lack of electricity and load shedding has had a notable impact on the economy of the country and is one of the reasons stated by foreign investors for the lack of investment in the country. With an improved supply of power to industry, there is likely to be an improvement in the economy as a whole. It should be noted that while these solar farms alone are unlikely to make a large impact in the shortages of electricity in the country, the cumulative impact of all the proposed solar energy products in the country will be substantial. The combined energy production for the Project will be up to 400 MW which begins to reflect a notable positive injection into the energy generation capacity from the region.

	Without enhancement	**With enhancement**
Extent	National (5)	National (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (60)**	**Medium (60)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be enhanced?	No	No
Enhancement: » No enhancement measures are required.		
Residual Impacts: No residual impacts are applicable.		

Nature: *Visual and sense of place impacts*

The effects on the community's sense of place will initially be felt during the construction period and will continue into the operation phase. The assessment of the negative change in the sense of place that was examined in the construction phase will likely be in place during the operation phase due to the long-term presence of Project infrastructure. However, according to the landowners' survey, one owner mentioned the severe impact the infrastructure will have on his business due to visual impacts.

	Without mitigation	**With mitigation**
Extent	Region (3)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)

Significance	**Medium (52)**	**Medium (52)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	No
Mitigation: » No mitigation measures are required.		
Residual Impacts: No residual risks are applicable.		

Nature: *The negative impact on the sense of place will have a negative financial effect on the tourism business on the farm*

The impact of tourism and agricultural land was assessed through a survey that was distributed among the landowners. According to the landowner's survey's one landowner mentioned that "the allure for the eco-tourist or hunter is to experience the unspoilt natural beauty, solitude and animal life of the area. Noise and light pollution will make this impossible. The unspoilt skyline and remoteness are what an African experience is all about. These projects should be developed close to existing towns e.g., Musina or Makhado where the natural beauty has been impacted already.

I would not be able to continue economic activities if this were to happen. There is no alternative farming activity as rainfall is too low and water is scarce". The impact is based on the landowners' responses, as the other landowners did not have inputs or did not respond to the survey or other forms of communication.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (65)**	**Medium (55)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Construct the solar panels on parts where the least arable land will be affected.		
Residual Impacts: No residual impacts are applicable.		

Decommissioning Phase Impacts

Upon the expiry of the solar facility's lifespan, the facility would need to be disbanded, although the facility would likely be upgraded in order to maintain and prolong the lifespan of the facility. If the facility is decommissioned, the land will be rehabilitated in order to return it to pre-project conditions. This also means that all impacts whether positive or negative, which take place during the operation phase will cease to exist. At the same time spending on the disassembly of the components and rehabilitation of land will increase the demand for construction services and other industries, thus stimulating economic activity in the local area, albeit over a temporary period. Socio-economic impacts stimulated during the decommissioning phase are expected to be similar to those that took place during the construction phase.

However, people who were permanently employed at the facility during the operational phase will lose their jobs during the decommissioning phase.

9.8.4 Overall Result

Both positive and negative impacts are expected throughout the construction and operation of the proposed solar energy facility. Positive impacts during both construction and operation are expected to be of medium and high significance pre-enhancement and can be increase to medium and high post-enhancement. Negative impacts during both construction and operation are expected to be of medium and low significance pre-mitigation and can be reduced to medium (different score) and low significance post-mitigation, depending on the type of impact.

The net positive impacts associated with the development and operation of the proposed Project are expected to outweigh the net negative effects. The Project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. The Project should therefore be considered for development. It should, however, be acknowledged that the negative impacts would be largely borne by the nearby farms and households residing on them, whilst the positive impacts will be distributed throughout both the local and national economies.

Due to this imbalance, it is recommended that the mitigation measures suggested, be strictly adhered to. Application of these mitigation measures will ensure that the negative impacts on the nearby farms and businesses are minimised and that the distribution of the potential benefits of the project are more balanced. It is important to value to commercial tourism farmer as he believes that he will not be able to continue with is operations due to the projects. It is thus advised that further communication towards the landowners will be vital for the project.

9.9. Assessment of the 'Do Nothing' Alternative

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

a) Land use and agriculture

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which predominantly covers "Low" to "Moderate" sensitivities. Small patches are characterised by "Very Low" sensitivities. In the assessment area there is no segregation of agricultural lands or crop fields with high potentials. The land capability and land potential in the assessed area concur. The "Very Low to Moderate" sensitivities also fall within the DAFF, (2017) requirements for a compliance statement report only. It is the specialist`s recommendation that the proposed solar power project and the associated infrastructure may be favourably considered. However, it is not envisaged that the number of agricultural employment opportunities generated by the agricultural activities within the project site would exceed the number of skilled, semi-skilled and unskilled employment opportunities that would be created by the construction and operation of Mutsho Solar PV3 (400 temporary jobs during construction and 33 permanent jobs during operation). The development of the solar energy facility would therefore result in a significant gain in employment numbers for the area in which the project site is located, albeit only for the construction phase, especially since the gain in employment numbers will not be accompanied by any losses in agricultural employment as a result of the proposed development.

In addition, the directly affected landowners would obtain an income from the solar farm (as the developer would pay a percentage of the revenue generated to the landowner in accordance with the lease agreement for the use of the land). This would contribute towards the financial stability of the landowners which would in turn contribute to the financial viability of the farming practices on the property. The implementation of the 'do nothing' alternative would retain the current land-use, fore-going the opportunity to generate renewable energy from the sun and at the same time continue the current agricultural activities on areas that fall outside of the solar energy facility footprint.

The 'do nothing' alternative would result in a lost opportunity for the landowners (in terms of implementing a compatible land use option, while still retaining the current land use, as well as a loss in long-term revenue) and the country (in terms of renewable energy). From this perspective the no-go alternative is not preferred when considering land use and agricultural aspects of the project site. Use of the identified site for the development of the proposed solar energy facility is considered to be a preferred land use as the benefits will outweigh the impacts.

From a visual perspective, however, the implementation of the 'do-nothing' alternative will conserve the landscape as it currently is. Transformation will lead to a change in the sense of place for the area; however, no fatal flaws have been identified in this regard.

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 area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
» There would however be an opportunity lost in terms of job creation, skills development and associated economic business opportunities for the local economy, as well as a loss of the opportunity to generate energy from a renewable resource without creating detrimental effects on the environment.

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 Musina and Mopane. 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 farm, 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 loss of new business opportunities.

Employment: The development of Mutsho Solar PV3 within the Musina Local Municipality will aid in a reduction of the unemployment rate, however if the solar farm 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 Mutsho Solar PV3 will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various renewable energy facilities are proposed to be developed in the area and in the Limpopo 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 other renewable energy facilities have been constructed and operated within the Province. 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 opportunity to contribute to the innovative energy sourcing methods as identified by the Musina Local Municipality as per a draft policy which sets out the criteria which will enable the evaluation of renewable energy generation infrastructure to be developed in a manner that will limit the potential negative impacts thereof will not be met should Mutsho Solar PV3 not be constructed with the implementation of the 'do nothing' alternative.

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. The area has experienced social challenges which has resulted in the need for socio-economic upliftment. The SIA concluded that there would be greater social benefits associated with the project than the 'do nothing' alternative.

Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred due to the loss of socio-economic benefits associated with the project when considering the current socio-economic conditions of the area.

c) Impact on electricity supply and targets regarding renewable energy

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 Mutsho Solar PV3 is only proposed to contribute a contracted capacity of up to 100MW 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.

9.10. Conclusion

The no-go is the continuation of the existing land use, i.e. maintain the status quo. As detailed in the sections above, there would be no environmental impacts on the site or to the surrounding local area due to the construction and operation activities of a solar farm with the implementation of this alternative. All negative impacts, specifically related to the development of the solar farm, discussed in this report will not materialise.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government. However, as the project site experiences ample solar resource and optimal grid connection opportunities, not developing Mutsho Solar PV3 would see such an opportunity being lost. In addition, the Limpopo Province will not benefit from additional generated power being evacuated directly into the Province's grid. As current land use activities can continue on the site once the project is operational, the loss of the land to this project during the operation phase (less than 1% of the larger project site) is not considered significant.

Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with Mutsho Solar PV3 subject to implementation of the recommended mitigation measures. All impacts associated with the project can be mitigated to acceptable levels. If the solar energy facility is not developed, the following positive impacts will not be realised:

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

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

CHAPTER 10: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 9, a solar facility development may have impacts (positive and negative) on natural resources, the social environment and on the people living in a project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with Mutsho Solar PV3 largely in isolation (from other similar developments).

This chapter assesses the potential for the impacts associated with the project to become more significant when considered in combination with the other operating or proposed renewable energy facility projects within the area.

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

This chapter of the EIA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.	The cumulative impacts associated with the development of Mutsho Solar PV3 are included and assessed within this chapter.

10.2 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the solar facility and its associated infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to confirm if such impacts are relevant to Mutsho Solar PV3 within the project site being considered for the development. This assessment considers whether the cumulative impact will result in:

- Unacceptable loss of threatened or protected vegetation types, habitat, or species through clearing, resulting in an impact on the conservation status of such flora, fauna, or ecological functioning.
- Unacceptable risk to freshwater features through disturbance associated with construction activities and increased runoff and erosion during the operation phase.
- Unacceptable risk to avifauna through habitat loss, displacement, and collision with project infrastructure.
- Unacceptable loss of high agricultural potential areas presenting a risk to food security and increased soil erosion.
- Unacceptable loss of heritage resources (including palaeontological and archaeological resources and the cultural landscape).
- Complete or whole-scale change in the sense of place and character of an area and unacceptable visual intrusion.
- Unacceptable negative impact to socio-economic factors and components.

Further to the above, positive cumulative impacts are also expected and will be associated with socio-economic aspects and benefits.

Figure 10.1 indicates the location of Mutsho Solar PV3 in relation to all other proposed renewable energy facilities known to be located within the surrounding area of the project site. These projects were identified using the DFFE Renewable Energy Database and current knowledge of projects operating and being proposed in the area. For the assessment of cumulative impacts, only developments within a 30km radius from the proposed Mutsho Solar PV3 were considered (**Table 10.1** and **Figure 10.1**), which is in line with the DFFE requirements.

Table 10.1: Renewable energy facilities located within the broader area (within a 30km radius) of the Mutsho Solar PV3 project site

Project Name	Project Status
ABC Prieska Solar 75MW Photovoltaic Power Plant	Authorised
Mutsho Solar PV1	In Progress
Mutsho Solar PV2	In Progress
Mutsho Solar PV4	In Progress

It should be noted that not all renewable energy developments presently under consideration by various IPPs will be built for operation. Not all proposed developments will be granted the relevant permits by the relevant authorities (DFFE, DMRE, NERSA and Eskom) and this is because of the following reasons:

- There may be limitations to the capacity of the existing or future Eskom grid.
- Not all applications will receive a positive Environmental Authorisation.
- There are stringent requirements to be met by applicants in terms of the REIPPP Programme and private off-taker bids, and a highly competitive process that only selects the best projects.
- Not all proposed projects will be viable because of lower renewable resources on some sites.
- Not all proposed projects will be able to reduce the associated negative impacts to acceptable levels or be able to mitigate the impacts to acceptable levels (fatally flawed).
- Not all proposed facilities will eventually be granted a generation license by NERSA and sign a Power Purchase Agreement with Eskom or private off-taker.
- Not all developers will be successful in securing financial support to advance their projects further.

As there is uncertainty whether all the above-mentioned renewable energy projects will be implemented, it is also difficult to quantitatively assess the potential cumulative impacts. The cumulative impacts of other known renewable energy projects in the broader area and Mutsho Solar PV3 are therefore qualitatively assessed in this Chapter.

It is important to explore the potential for cumulative impacts on a quantitative basis as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by renewable energy developments throughout South Africa, while the significance of the cumulative impact on visual amenity may only be influenced by renewable energy developments that are in closer proximity to each other, e.g., up to 30 km to 50 km apart. For practical purposes a sub-regional scale of 30km has been selected for this cumulative impact evaluation. This is in accordance with the DFFE requirements specified within the Acceptance of Scoping for the project.

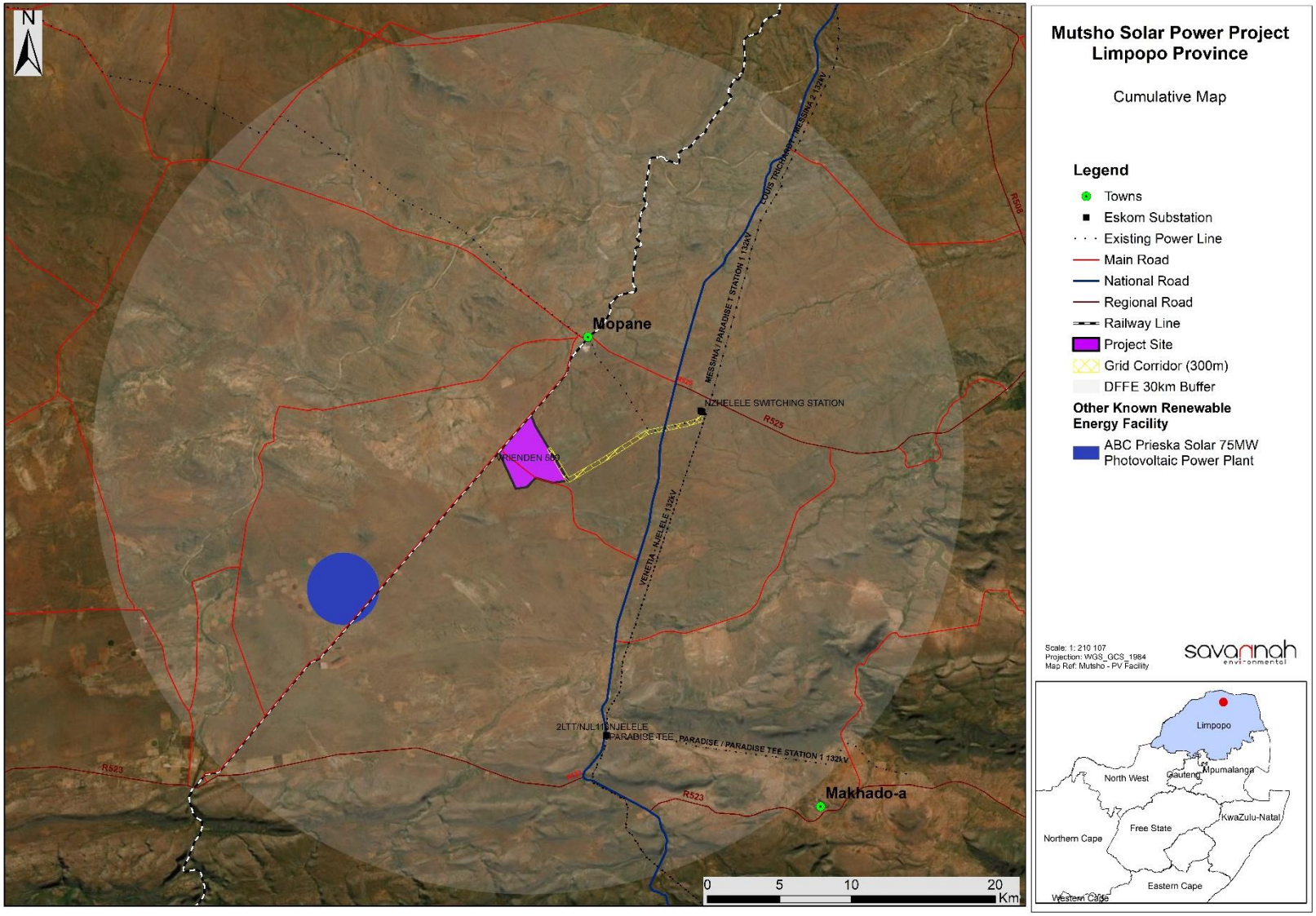


Figure 10.1: Cumulative map illustrating other approved and/or constructed renewable energy facilities located within a 30km radius of Mutsho Solar PV3

In the sections below, a summary of the potential for a cumulative impact resulting from several renewable energy developments within a 30km radius of Mutsho Solar PV3 are explored (refer also to the specialist reports contained in **Appendix D** to **H**). Impacts are assessed accordingly in terms of the proposed project in isolation and the impact considering other projects within the area or the cumulative impact, assuming the implementation of mitigation, as was deemed relevant by the specialist. The approach taken by the various specialists in assessing cumulative impacts is informed by the scale at which the impact is likely to occur.

10.3 Cumulative Impacts on Terrestrial Ecology (including flora and fauna) and Wetlands

Localised cumulative impacts on ecology include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers, dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Nature: *Cumulative Impacts to biodiversity associated with the proposed project.*

The development of the proposed infrastructure will contribute to cumulative habitat loss, especially in the ecological corridors like the watercourses and thereby impact the water resource and ecological processes in the region.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local Area (3)	Local Area (3)
Duration	Moderate Term (3)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

- Should the vegetation be removed, the impact cannot be mitigated. The extent of clearing should however be minimised as far as possible.
- Mitigation measures recommended for each project in the area must be implemented.

Residual Impacts:

Will result in the loss of:

- Watercourses
- ESA1
- Protected trees;
- SCC fauna and avifauna species (especially the species listed in the Bathusi Environmental Consulting (2018) report);
- Portions of the Vhembe Biosphere Reserve; and
- Niche habitats.

10.4 Cumulative Impacts on Avifauna

Localised cumulative impacts on avifauna include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers (such as the nearby ABC Prieska Solar PV Facility and the existing powerlines). These include dust deposition, noise and vibration,

disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Long-term cumulative impacts due to the large number of development close by can lead to the loss of endemic and threatened species, loss of habitat and vegetation types and even degradation of well conserved areas. A number of solar plants and powerlines can already be found in the project area, this combination of obstacles increases the risk of bird collisions and habitat loss as well as territorial disputes (species forced out of the one area to just again be forced out).

Nature: *The cumulative impact of the proposed development will contribute to cumulative habitat loss within CBAs/ ESAs and thereby impact the ecological processes in the region.*		
	Overall impact of the proposed project considered in isolation (post mitigation)	**Cumulative impact of the project and other projects in the area (post mitigation)**
Extent	Local Area (3)	Local Area (3)
Duration	Moderate Term (3)	Long Term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: » This impact cannot be mitigated as the loss of vegetation is unavoidable. The extent of clearing should however be minimised as far as possible. » Mitigation measures recommended for each project must be implemented.		
Residual Impacts: Will result in the loss of: » Watercourses » ESA1 » Protected trees; » SCC fauna and avifauna species (especially the species listed in the Bathusi Environmental Consulting (2018) report); » Portions of the Vhembe Biosphere Reserve; and » Niche habitats.		

10.5 Cumulative Impacts on Soils and Agricultural Potential

The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.

10.6 Cumulative Impacts on Heritage (cultural landscape)

As no direct impacts on heritage resources will occur as a result of the proposed project, the project will not contribute to impacts on heritage resources. It is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise agricultural landscape. The proposed development is therefore likely to result in a change to the sense of place of the area.

10.7 Cumulative Visual Impacts

There is only one other authorised solar PV project within 30km of the four proposed Mutsho PV projects. The potential for cumulative impacts associated with solar projects is therefore low.

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

There is one other renewable energy / solar PV project within 30km (ABC Prieska). This other project is located within or close to an area that is cultivated.

The Mutsho projects are located within an area of natural forest that will be cleared. Whilst the ABC Prieska site has not been visited, it seems possible that it will not result in removal of forest.

The proposed project appears likely to be the only one that will result in change of a natural landscape that is relatively typical in the region.

The cumulative impact was therefore assessed as low and the cumulative contribution low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings, (2)	Site and immediate surroundings, (2)
Duration	Long term, (4)	Long term, (4)
Magnitude	Small (0)	Small (0)
Probability	Improbable, (2)	Improbable, (2)
Significance	**Low (12)**	**Low (12)**
Status (positive or negative)	Neutral	Neutral
Reversibility	High	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

Planning:

» Plan levels to minimise earthworks to ensure that levels are not elevated.
» Plan to maintain the height of structures as low as possible.
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.

Operations:

» Reinstate any areas of vegetation that have been disturbed during construction.
» Remove all temporary works.
» Monitor rehabilitated areas post-construction and implement remedial actions.
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site
» Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Nature: *Cumulative impact on views from tourist routes including main roads and local roads.*

There is one other solar PV project within 30km (ABC Prieska). This other project is located within or close to an area that is cultivated.

The proposed project appears only likely to impact on local roads and with appropriate mitigation this will be negated.

It appears unlikely that ABC Prieska will have a significant impact on tourism routes.

The cumulative impact was therefore assessed as low and the cumulative contribution low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other industrial development in the area**
Extent	N1 & R523 Local (2) Local Roads Local (2)	Region (3)
Duration	N1 & R525 Long term (4) Local Roads Long term (4)	Long term (4)
Magnitude	N1 & R525 Small (0) Local Roads Minor (2)	Small to minor, (1)
Probability	N1 & R525 Very Improbable (1) Local Roads Improbable (2)	Improbable (2)
Significance	**N1 & R525** **Low (6)** **Local Roads / Preferred Option** **Low (16)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, possible mitigation will not change the level of significance.	Unknown

Mitigation:

Planning:

» Design /modify layout to keep PV panels off the low ridgeline on the south-west side of the site.
» Plan levels to minimise earthworks to ensure that levels are not elevated.
» Plan to maintain the height of structures as low as possible.
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.

Operations:

» Reinstate any areas of vegetation that have been disturbed during construction.
» Remove all temporary works.
» Monitor rehabilitated areas post-construction and implement remedial actions.
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
» Control the height of stored materials and the use of large equipment.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site.
» Rehabilitate and monitor areas post-decommissioning and implement remedial actions

Nature: *Cumulative impact on tourist's view from trains.*

There is one other solar PV project within 30km (ABC Prieska). This other project is also located close to the railway at a distance of approximately 12.5km to the south of the Mutsho projects. Whilst they could both be visible from the train, they will not be viewed at the same time.

The cumulative impact was therefore assessed as low and the cumulative contribution low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other industrial development in the area**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (20)**	**Low (20)**
Status (positive or negative)	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes, possible mitigation will not change the level of significance.	Unknown

Mitigation:

Planning:

» Design /modify layout to keep PV panels off the low ridgeline on the south-west side of the site.
» Plan levels to minimise earthworks to ensure that levels are not elevated.
» Plan to maintain the height of structures as low as possible.
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.

Operations:

» Reinstate any areas of vegetation that have been disturbed during construction.
» Remove all temporary works.
» Monitor rehabilitated areas post-construction and implement remedial actions.
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
» Control the height of stored materials and the use of large equipment.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site.
» Rehabilitate and monitor areas for vegetation cover post-decommissioning and implement remedial actions.

Nature: *Glare Impacts*

The impact of glare arising from the proposed project is unlikely.

It is possible that glare associated with other proposed projects could impact on the roads. Given that mitigation of possible impacts should be relatively simple to achieve, it is assumed that levels of impact from other projects will also be minor.

The overall cumulative impact is assessed as having a low significance. The contribution of the proposed project to this cumulative impact is assessed as low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings (2)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Small, (0)	Small, (0)
Probability	Very Improbable, (1)	Improbable (2)
Significance	**Low (6)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Unknown
Mitigation: Should glare prove problematic which is more likely with a tracking system, the trackers need to be programmed to prevent early morning reflection towards the roads.		

Nature: *Lighting impacts*

There is potential for security lighting and operational lighting associated with other solar energy projects to impact significantly on the area but with mitigation the contribution of this project to possible cumulative impacts is likely to be of low significance.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings (2)	Region (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor to Small (1)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (14)**	**Low (18)**
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Unknown

Mitigation:

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

10.8 Cumulative Socio-Economic Impacts

Only one other known authorised renewable energy facility has been identified that will create the conditions for cumulative effect, namely ABC Prieska Solar PV Plant. Only cumulative impacts that will have the potential for a significant influence are analysed:

- Increase in production - The initial investment spend on the project will inject significant business sales/ production for the local and regional economy. The economic impact arising from the initial investment will be felt throughout the economy with windfall effects benefitting related sectors in the economy.
- Employment creation - Increase in employment creation for the local workforce.

» Demographic shifts - Influx of migrant labour and job seekers due to job opportunities presented by numerous projects.

In addition to the negative cumulative impact noted above (i.e., demographic shifts), numerous positive impacts are expected to accumulate in the region such as increased production, GDP, employment, skills and household income.

The following tables summarise and rate the expected cumulative effects.

Nature: *Increase in economic production*		
	Cumulative Contribution of proposed project	**Cumulative Impact without proposed project**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (60)**	**Medium (60)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes	Yes
Confidence in findings	High	
Enhancement: » No enhancement measures are required.		

Nature: *Increase in the number of employment opportunities*		
	Cumulative Contribution of proposed project	**Cumulative Impact without proposed project**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	High (8)
Probability	Probable (3)	Probable (3)
Significance	**Medium (39)**	**Medium (45)**
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes	Yes
Confidence in findings	High	
Enhancement: » Employment of local residents as far as possible should be encouraged.		

Nature: *Influx of migrant labour and job seekers due to job opportunities presented by numerous projects*

	Cumulative Contribution of proposed project	Cumulative Impact without proposed project
Extent	Regional (3)	Regional (3)
Duration	Medium term (3)	Medium term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (48)**	**Medium (40)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings	High	
Mitigation: » Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration. » Provide training for unemployed local community members with insufficient skills and thus increase absorption of local labour thereby decreasing in-migration. » Manage recruitment and marketing for vacancies with a preference of residents within the municipality.		

10.9 Conclusion regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development of Mutsho Solar PV3 throughout all phases of the project life cycle and within all areas of study considered as part of this EIA report. The main aim for the assessment of cumulative impacts considering Mutsho Solar PV3 is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The following conclusions can be drawn regarding the cumulative impacts associated with the project:

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes) due to the development of Mutsho Solar PV3 and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no significant loss of sensitive and significant aquatic features. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of Mutsho Solar PV3 and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. This is due to the limited footprint expected to be associated with the renewable energy facilities proposed in authorised in the area. The cumulative impact is therefore acceptable.
- The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.
- Change to the sense of place and character of the area is expected with the development of the proposed Mutsho Solar PV3 and other renewable energy facilities within a 30km radius of the site. Other large scale industrial operations including mining operations and power stations are relatively obvious in the region. Whilst the proposed project will create a new industrial operation and change the character

of an area of rural landscape, this is not entirely out of character with the region. The cumulative impact is therefore considered to be acceptable.

- There will be no unacceptable loss of heritage resources associated with the development of Mutsho Solar PV3. There will also be no unacceptable impacts to the cultural landscape as a result of the development of the facility provided that the recommended development buffers along major routes are adhered to. The cumulative impact is therefore acceptable.
- No unacceptable social impacts are expected to occur. Two positive cumulative impacts are expected to occur from a social perspective (i.e., increase in production and employment opportunities). These impacts will be of medium significance. Positive cumulative impacts are expected to be beneficial at a regional level. The cumulative impact is therefore acceptable.

The cumulative impacts associated with Mutsho Solar PV3 will be of a low and medium significance. A summary of the cumulative impacts is included in **Table 10.3** below.

Table 10.3: Summary of the cumulative impact significance for Mutsho Solar PV3.

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Terrestrial and Freshwater Ecology	Low	Low
Avifauna	Low	Low
Soils and Agricultural Potential	Low	Low
Heritage (including archaeology, palaeontology and sense of place)	Low	Low
Visual	Low	Low
Socio-Economic	*Positive impacts:* Medium *Negative impacts:* Medium	*Positive impacts:* Medium *Negative impacts:* Medium

Based on the specialist cumulative assessment and findings, the development of Mutsho Solar PV3 and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that Mutsho Solar PV3 cumulative impacts will be of low and medium significance. Based on all other areas of study considered as part of this EIA report, the development of Mutsho Solar PV3 will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

CHAPTER 11: CONCLUSIONS AND RECOMMENDATIONS

Mutsho Power (Pty) Ltd is proposing the construction and operation of a commercial Photovoltaic (PV) Solar Energy Facility and associated infrastructure on the Remaining Extent of Farm Vrienden 589 MS, located approximately 8km south-west of Mopane and 39km south-west of Musina, within the Musina Local Municipality and the Vhembe District Municipality in the Limpopo Province. The facility will have a contracted capacity of up to 100MW and will be known as Mutsho Solar PV3. The project is planned as part of a cluster of renewable energy projects, which include three (3) additional 100MW Solar PV Energy Facilities and grid connection infrastructure connecting the facilities to the national grid, with the point of connection being the existing Nzhelele Substation. It is the developer's intention to develop the projects in a phased approach (i.e., 100MW at a time). The projects are proposed by separate Specialist Purpose Vehicles (SPVs) and are assessed through separate Environmental Impact Assessment (EIA) processes. Similarly, the grid connection solution will be subjected to a separate Basic Assessment (BA) process in order to facilitate handover of this infrastructure to Eskom once constructed.

The development footprint[17] will contain the following infrastructure to enable the solar facility to generate up to 100MW:

- Solar PV array comprising PV panels and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- 33/132kV onsite substation (IPP Portion), including associated equipment and infrastructure – the onsite substation will be completely constructed as part of phase 1 (i.e., as part of Mutsho Solar PV1) but only equipped for the first 100MW. When such a time comes that the next 100 MW is constructed, the existing substation will be equipped for the additional 100MW generation capacity (i.e., additional transformers, extending the busbars, etc.). This approach will be followed as each 100MW facility is added to the cluster.
- Electrical and auxiliary equipment required at the Collection Station that serves the solar energy facility, including a switchyard/bay, control building, fences, etc.
- Cabling from the onsite substation to the Collection Station (either underground or overhead).
- Site offices, warehouses, and guardhouses.
- Water storage tanks at admin block for human consumption.
- Laydown areas.
- Internal gravel distribution roads

The overarching objective for Mutsho Solar PV3 is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and maintenance costs, as well as potential social and environmental impacts in accordance with the principles of sustainable development. Local level environmental and planning issues have been assessed through the EIA process with the aid of site-specific specialist studies in order to delineate areas of sensitivity within the project site. These site-specific specialist studies have assisted in informing and optimising the design of the solar farm.

A summary of the recommendations and conclusions for the proposed project is provided in this chapter.

[17]The development footprint is the result of detailed design by the developer which the consideration of sensitive environmental features which are required to be avoided by the solar facility infrastructure.

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

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

Requirement	Relevant Section
3(1)(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 Mutsho Solar PV3 has been included in **section 11.2**.
3(1)(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report 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 Mutsho Solar PV3 has been included as **section 11.5**. An Environmental Sensitivity and Layout map of Mutsho Solar PV3 has been included as **Figure 11.1** which overlays the development footprint (as assessed within the EIA) of the solar facility with the environmental sensitive features located within the development area. A summary of the positive and negative impacts associated with Mutsho Solar PV3 has been included in **section 11.2**.
3(1)(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation of Mutsho Solar PV3 have been included in **section 11.6**.
3(q) 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 Mutsho Solar PV3 should be authorised has been included in **section 11.5**.

11.2 Evaluation of Mutsho Solar PV3

The preceding chapters of this report, together with the specialist studies contained within **Appendices D-L** provide a detailed assessment of the potential impacts that may result from the development of Mutsho Solar PV3. This chapter concludes the environmental assessment of the solar facility by providing a summary of the results and conclusions of the assessment of both the project site and development footprint for the solar energy facility. In so doing, it draws on the information gathered as part of the EIA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws or unacceptable impacts were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the development footprint and the undertaking of the construction and operational bird monitoring, as specified by the specialists.

The potential environmental impacts associated with Mutsho Solar PV3 assessed through the EIA process include:

» Impacts on terrestrial ecology (flora and fauna).
» Impacts on freshwater ecology.
» Impacts on avifauna.
» Impacts on soils and agricultural potential.
» Impacts on heritage resources, including archaeology, palaeontology and the cultural landscape.
» Visual impacts on the area imposed by the components of the facility.
» Positive and negative social impacts.

The development footprint, as assessed in the EIA Report is presented in **Figure 11.1**.

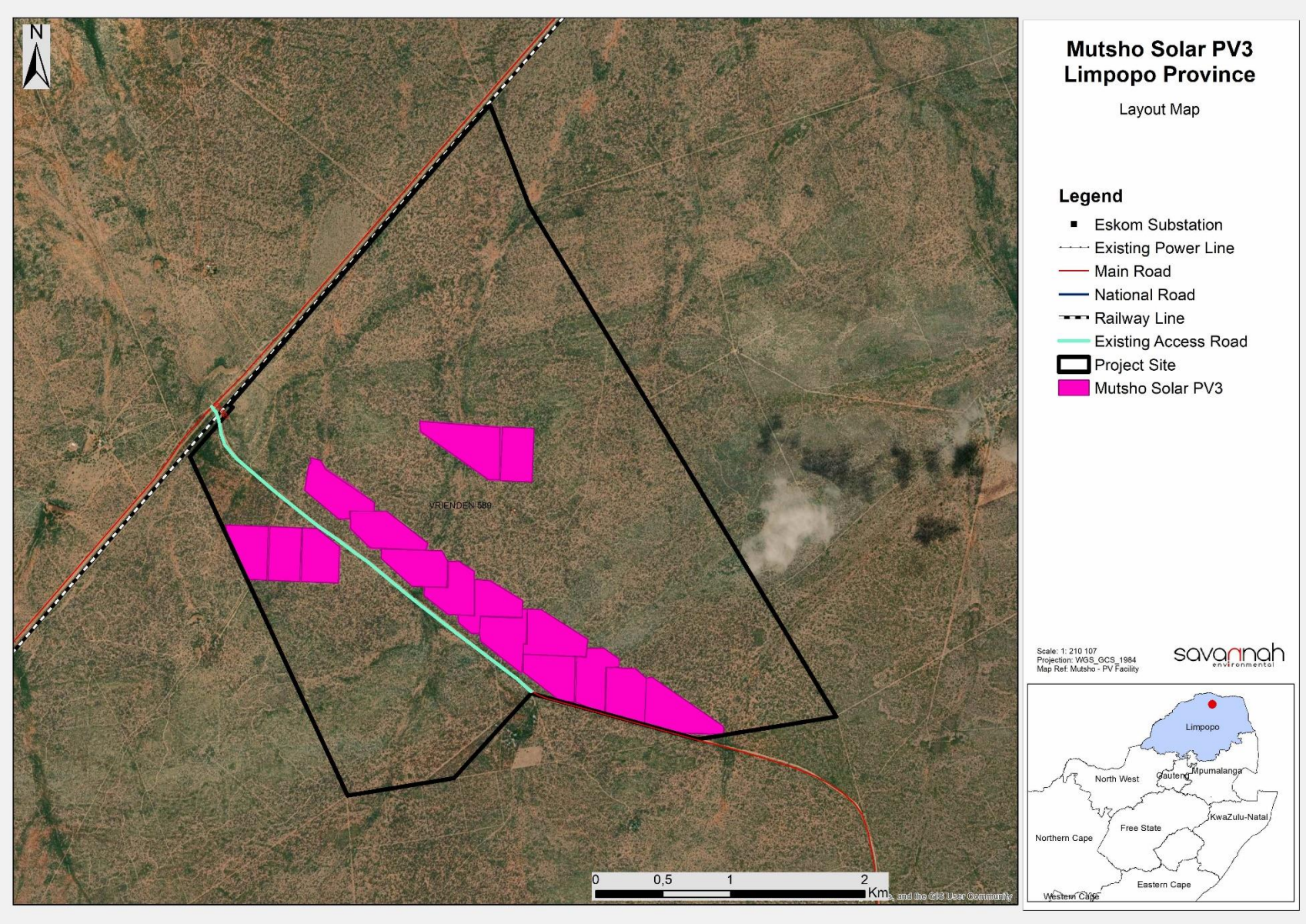


Figure 11.1: The development footprint of Mutsho Solar PV3, as assessed within the EIA Report

11.2.1 Impacts on Terrestrial Ecology (including flora and fauna) and Freshwater Ecology

Terrestrial Ecology

Four habitat units were identified during the assessment and included closed woodland, a rocky area, watercourses, and mopane bushveld. The sensitivity of these habitats ranged from high to medium with the closed woodland, rocky area and watercourses regarded as high sensitivity due to the species recorded and the role of this intact unique habitat to biodiversity, whilst the mopane bushveld is regarded as having a medium sensitivity.

A total of 72 plant species were found within the project/study area, which consisted of 67 native, 0 Red List, 4 protected, 0 SA endemic, 0 alien, and 1 NEM:BA listed invasive species.

A total of 13 mammal, 0 amphibian, and 3 reptile species were recorded within the project/study area. No amphibian or reptile SCC were recorded within the study area; and no mammal SoCC were recorded, namely. It was determined that the development will not detrimentally impact these populations as no faunal SCC were recorder within the project/study area.

During the field assessment 3 species of protected trees were observed: *Boscia albitrunca* (Shepard's tree), *Adansonia digitata* (Baobab), and *Sclerocarya birrea subsp. caffra* (Marula). It is of vital importance that a search a rescue along with permit applications be done prior to the commencement of the development. The density of the trees is regarded a very high especially in the case of *B. albitrunca*.

Biodiversity maintenance is one key ecological service provided by the identified terrestrial biodiversity areas through their ecological integrity, importance and functioning. As such the preservation of these systems is an important aspect to consider for the proposed project.

Any development in high sensitivity areas must be avoided as far as possible, which will occur with the selection of the project area. Development within the high sensitivity areas within the project area will lead the direct destruction and loss of functional habitats; and the faunal species that are expected to utilise this habitat. Thus, if these areas are not maintained in a natural or near natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved. The mitigation measures, management and associated monitoring regarding the expected impacts will be the most important factor of this project and must be considered by the issuing authority.

Freshwater Ecology

One (1) form of a watercourse was identified and delineated within the regulated area applied, namely ephemeral drainage lines/ features. Natural wetlands were absent from the project area. The nearest known 'pan' system is more than 3 km north-west of the project area. No functional assessment was completed for the delineated watercourses. A buffer width of 15 m is recommended for each of the drainage features. Regulated areas delineated with a 32m and 100m buffer were also identified and recommended for each drainage feature.

Considering the findings of the assessment, no fatal flaws were identified from a freshwater ecology perspective. Provided that the mitigation is successfully implemented, the specialist is of the opinion that the establishment of the proposed solar facility is unlikely to pose a significant threat to local watercourses with all anticipated impacts having a Low residual risk rating. Supporting remediation measures prescribed herein should also be considered for a project specific stormwater management

11.2.2 Impacts on Avifauna

Based on the desktop assessment the project area falls within an ESA1, Vhembe Biosphere Reserve, the Musina Mopane Bushveld vegetation type and have a known occurrence of avifauna SCCs found in and around the project area.

The field assessment was conducted in the winter season and is regarded as a follow up survey that was performed by Pachnoda (2018) in the summer. During this survey fifty-seven (57) bird species were recorded, none of which were an SCC, four species were however identified that is regarded as risk species due to collisions and electrocutions by PV plants and associated infrastructure. They are Southern Pale Chanting Goshawk (*Melierax canorus*), Helmeted Guineafowl (*Numida meleagris*), African Harrier-Hawk (*Polyboroides typus*) and Pied Crow (Corvus albus). Four SCCs, Kori Bustard (*Ardeotis kori*); Black Stork (*Ciconia nigra*); Saddle-billed Stork (*Ephippiorhynchus senegalensis*), and White-backed Vulture (Gyps africanus) were recorded by Pachnoda (2018) which does increase the overall sensitivity of the area.

The main impacts identified to be associated with the proposed project are the loss of habitat, including the loss of nest sites in larger trees such as the Baobabs that will be lost in the area, disturbance, collision and electrocution risk. These impacts are expected to have a large impact on the avifauna community and more specifically the SCCs that has been found and could likely occur in the area.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts. Considering that this area has been identified as being of significance for biodiversity maintenance and ecological processes (Moderate and High sensitivity), development may proceed but with caution and only with the implementation of mitigation measures.

Considering the above-mentioned information, it is the opinions of the specialists that the project, may be favourably considered, on condition all prescribed mitigation measures and supporting recommendations are implemented.

11.2.3 Impacts on Soils and Agricultural Potential

The most sensitive soil forms identified within the assessment corridor is the Hutton and Nkonkoni soil forms.

The assessment area is associated with arable soils, due to some of the type of soils available. However, the climate limits 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.

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which predominantly covers "Low" to "Moderate" sensitivities. Small patches are characterised by "Very Low" sensitivities. In the assessment area there is no segregation of agricultural lands or crop fields with high potentials. The land capability and land potential in the assessed area concur. The "Very Low to Moderate" sensitivities also falls within the DAFF, (2017) requirements for a compliance statement report only (refer to **Appendix F**).

It is the specialist's opinion that the proposed solar power project 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 power project may be favourably considered.

11.2.4 Impacts on Heritage Resources (archaeology, palaeontology and cultural landscape)

The current and past heritage assessments of this property have identified limited heritage resources of cultural value. A previous assessment identified Farm Vrienden 589 as preferred for development with limited impacts to heritage resources anticipated as its overall heritage sensitivity is regarded as LOW overall. The most significant site identified in the vicinity of the development is Site V04. It is recommended that Site V04, the Baobab Room, must not be impacted by any activity and any proposed activity on this farm must adhere to a buffer area of 100m around this site. This site is located a significant distance from the area proposed for development.

The PIA notes that "The scarcity of fossil heritage at the proposed development footprint indicate that the impact of the (of the development) will be of a low significance in palaeontological terms… Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources."

In light of these findings, there is no objection to the proposed development on heritage grounds on condition that the recommendations outlined below are adhered to.

Based on the outcomes of the Heritage Impact Assessment, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that:

- The recommendations in the VIA are implemented.
- A 200m no-go buffer must be implemented around site V04.
- A 100m no-go buffer must be implemented around sites MOP112 and MOP115
- The Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- Should any buried archaeological resources or human remain or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

11.2.5 Visual Impacts

The following sensitivities have been identified from a visual perspective:

- Highly sensitive areas include:
  - Areas immediately surrounding homesteads development of which is likely to significantly change the character of views for residents and guests. A 500m buffer is proposed which should be sufficient to ensure that development does not totally dominate views. It is possible that receptors (owners /residents / guests) have no concern regarding the development of these areas, in which case the sensitivity rating will reduce.

- Medium sensitivity areas include:

- Corridors beside the roads that could be affected. Due to distance, the main roads that run through the area are unlikely to be significantly impacted. As indicated in previously, given that local unsurfaced roads are likely to provide access to local lodges, these also have tourism importance.

- Low sensitivity areas include:
  - All other areas of the proposed site.

It was determined that the potential visual impacts would be:
- The impact on the landscape in the area was assessed as having an impact of low significance with mitigation.
- The impact relating to views from local main roads was assessed as having a low significance after mitigation.
- The impact relating to tourist views from trains was assessed as having a low significance after mitigation.
- The impact relating to views from settlements was assessed as having a low significance after mitigation.
- The impact relating to views from homesteads and recreational/local tourism facilities was assessed as having a medium negative significance without mitigation and a low significance after mitigation.
- The impact relating to lighting (security and operational lighting) was assessed as likely to have low significance with mitigation.
- The impact relating to glare will be of low significance with appropriate mitigation.

The proposed project will generally result in landscape and visual impacts of low to high significance. Subject to mitigation measures being undertaken, mitigation measures arising and the recommended mitigation measures, from a Landscape and Visual Impact perspective, it is the specialist's opinion that there is no reason why the proposed layout should not be authorised.

11.2.6 Socio-Economic Impacts

Impacts are expected to occur with the development of Mutsho Solar PV3 during the construction, operation and decommissioning phases. Both positive and negative impacts are identified and assessed.

Impacts during construction include:
- Impact on production.
- Impact on the Gross Domestic Product (GDP).
- Impact on employment creation.
- Skills development.
- Household income and standard living.
- Temporary increase in government revenue.
- Change in sense of place.
- Impact on agricultural operations
- Influx of people.
- Impact on economic and social infrastructure

Impacts during the operation phase include:
- Impact on production.
- Impact on the GDP.
- Employment creation.
- Household income and standard of living.
- Increase in government revenue.

- Rental revenue for landowners.
- Improvement in energy sector generation.
- Visual and sense of place impacts.
- Impacts on agricultural operations.

Both positive and negative impacts are expected throughout the construction and operation of the proposed solar energy facility. Positive impacts during both construction and operation are expected to be of medium and high significance pre-enhancement and can be increase to medium and high post-enhancement. Negative impacts during both construction and operation are expected to be of medium and low significance pre-mitigation and can be reduced to medium (different score) and low significance post-mitigation, depending on the type of impact.

The net positive impacts associated with the development and operation of the proposed Project are expected to outweigh the net negative effects. The Project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. The Project should therefore be considered for development. It should, however, be acknowledged that the negative impacts would be largely borne by the nearby farms and households residing on them, whilst the positive impacts will be distributed throughout both the local and national economies.

Due to this imbalance, it is recommended that the mitigation measures suggested, be strictly adhered to. Application of these mitigation measures will ensure that the negative impacts on the nearby farms and businesses are minimised and that the distribution of the potential benefits of the project are more balanced. It is important to value to commercial tourism farmer as he believes that he will not be able to continue with is operations due to the projects. It is thus advised that further communication towards the landowners will be vital for the project.

11.2.7 Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of Mutsho Solar PV3 throughout all phases of the project life cycle and within all areas of study considered as part of this EIA report. The main aim for the assessment of cumulative impacts considering Mutsho Solar PV3 is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The following conclusions can be drawn regarding the cumulative impacts associated with the project:

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes) due to the development of Mutsho Solar PV3 and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no significant loss of sensitive and significant aquatic features. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of Mutsho Solar PV3 and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. This is due to the limited footprint expected to be associated with the

renewable energy facilities proposed in authorised in the area. The cumulative impact is therefore acceptable.

- The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.
- Change to the sense of place and character of the area is expected with the development of the proposed Mutsho Solar PV3 and other renewable energy facilities within a 30km radius of the site. Other large scale industrial operations including mining operations and power stations are relatively obvious in the region. Whilst the proposed project will create a new industrial operation and change the character of an area of rural landscape, this is not entirely out of character with the region. The cumulative impact is therefore considered to be acceptable.
- There will be no unacceptable loss of heritage resources associated with the development of Mutsho Solar PV3. There will also be no unacceptable impacts to the cultural landscape as a result of the development of the facility provided that the recommended development buffers along major routes are adhered to. The cumulative impact is therefore acceptable.
- No unacceptable social impacts are expected to occur. Two positive cumulative impacts are expected to occur from a social perspective (i.e., increase in production and employment opportunities). These impacts will be of medium significance. Positive cumulative impacts are expected to be beneficial at a regional level. The cumulative impact is therefore acceptable.

The cumulative impacts associated with Mutsho Solar PV3 will be of a low and medium significance. A summary of the cumulative impacts is included in **Table 11.2** below.

Table 11.2: Summary of the cumulative impact significance for Mutsho Solar PV3.

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Terrestrial and Freshwater Ecology	Low	Low
Avifauna	Low	Low
Soils and Agricultural Potential	Low	Low
Heritage (including archaeology, palaeontology and sense of place)	Low	Low
Visual	Low	Low
Socio-Economic	*Positive impacts:* Medium *Negative impacts:* Medium	*Positive impacts:* Medium *Negative impacts:* Medium

Based on the specialist cumulative assessment and findings, the development of Mutsho Solar PV3 and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that Mutsho Solar PV3 cumulative impacts will be of low and medium significance. Based on all other areas of study considered as part of this EIA report, the development of Mutsho Solar PV3 will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

11.2.8 Assessment of 'Do nothing' Alternative

The no-go is the continuation of the existing land use, i.e. maintain the status quo. There would be no environmental impacts on the site or to the surrounding local area due to the construction and operation activities of a solar farm with the implementation of this alternative. All negative impacts, specifically related to the development of the solar farm, discussed in this report will not materialise.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government. However, as the project site experiences ample solar resource and optimal grid connection opportunities, not developing Mutsho Solar PV3 would see such an opportunity being lost. In addition, the Limpopo Province will not benefit from additional generated power being evacuated directly into the Province's grid. As current land use activities can continue on the site once the project is operational, the loss of the land to this project during the operation phase (less than 1% of the larger project site) is not considered significant. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with Mutsho Solar PV3 subject to implementation of the recommended mitigation measures. All impacts associated with the project can be mitigated to acceptable levels. If the solar energy facility is not developed, the following positive impacts will not be realised:

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

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

11.3. Assessment of the Facility Layout

The indicative facility layout/development footprint assessed within this EIA Report (**Figure 11.2**) was designed by the project developer in order to respond to and avoid the sensitive environmental and social features located within the project site, which were identified by the specialists during the Scoping Phase of the EIA process. This approach ensured the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate, and offset) to the proposed project, which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the project site.

Although the proposed layout overlaps with areas of sensitivity, the specialists have concluded that the project as proposed can be authorised on condition that the recommended mitigation measures are implemented. As such, the impact of this proposed Facility Layout is considered to be acceptable and the layout is recommended for approval. Final micro-siting must however be undertaken prior to construction considering all mitigation measures recommended within this EIA Report and associated specialist studies.

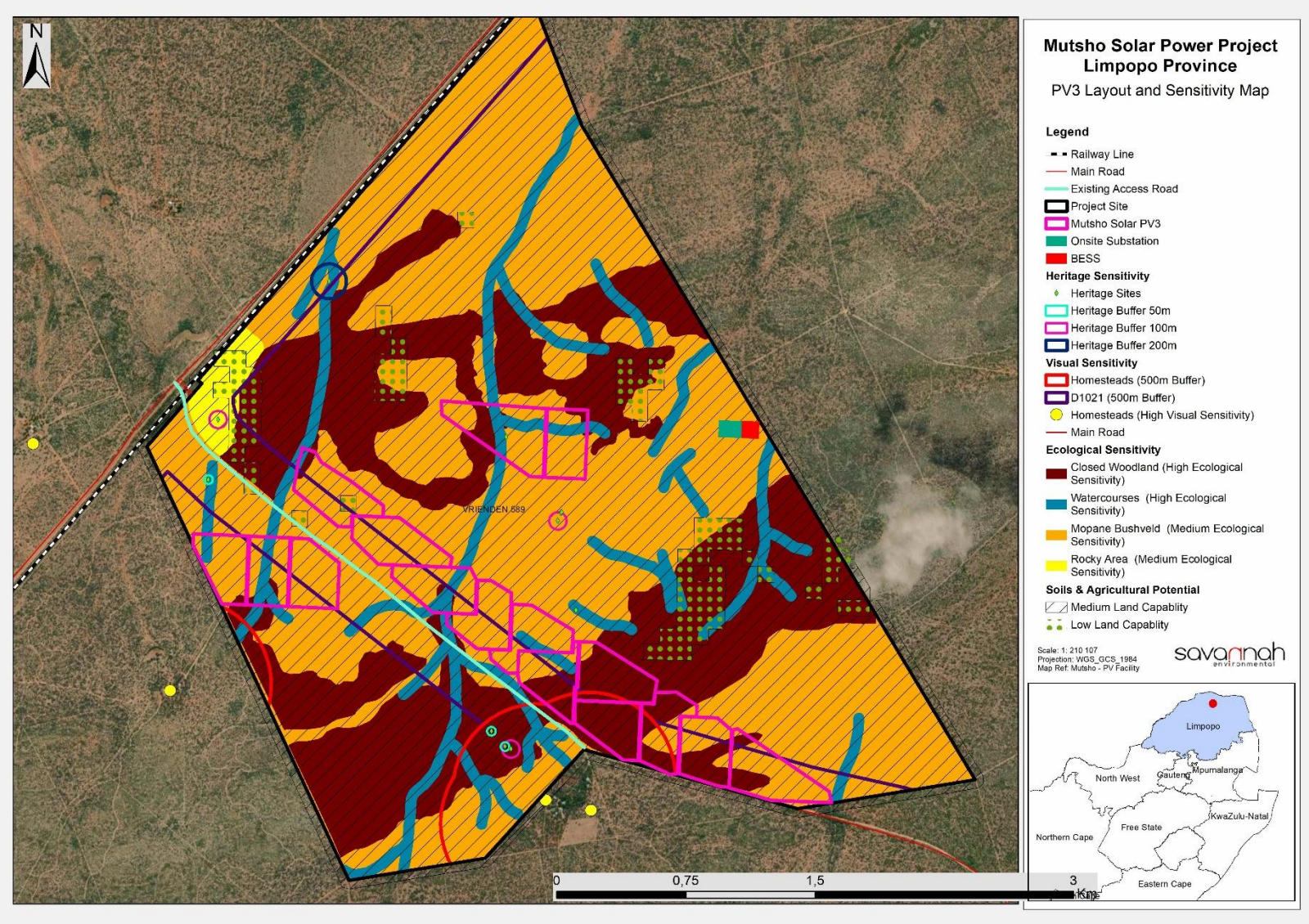


Figure 11.2: The development footprint of Mutsho Solar PV3, as assessed within this EIA Report, overlain on the identified sensitive environmental features (also refer to **Appendix P**)

11.4. Environmental Costs versus Benefits of Mutsho Solar PV3

Environmental costs (including those to the natural environment, economic and social environment) can be anticipated at a local and site-specific level and are considered acceptable provided the mitigation measures as outlined in the EIA Report and the EMPr are implemented and adhered to. No fatal flaws have been identified. These environmental costs could include:

- *Loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for the solar facility* – The cost of loss of biodiversity can be minimised through the implementation of the recommended mitigation measures, including limiting clearance within areas of high sensitivity.
- *Impacts on freshwater resources* - provided that the mitigation is successfully implemented, the specialist is of the opinion that the establishment of the proposed solar facility is unlikely to pose a significant threat to local watercourses with all anticipated impacts having a Low residual risk rating.
- *Impacts on birds*– loss of bird species due to collision with infrastructure and disturbance associated with construction and operation of the facility. Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts.
- *Loss of land for agriculture* – The development will remove areas available for agricultural activities. However, based on the small development footprint of the solar facility and the fact that agricultural potential of the site is low to moderate, this will be limited and not significant.
- *Visual impacts associated with the solar facility/impacts to the sense of place* – Mutsho Solar PV3 will be visible to receptors up to a distance of 3km from the site and mainly of a high significance. No mitigation of this impact is possible (i.e., the structures will be visible in the landscape), but general mitigation and management are required as best practise to minimise secondary visual impacts which may arise from mismanagement of the site.
- *Loss of heritage and palaeontological resources* – based on the outcomes of the Heritage Impact Assessment, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that the recommended buffers are implemented.

Benefits of Mutsho Solar PV3 include the following:

- The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development, supporting the Just Energy Transition in the region. These will persist during the pre-construction, construction, operation and decommissioning phases of the project.
- The project provides an opportunity for a new land use on the affected properties which would result in additional financial benefits to the directly affected landowners through compensation. It is important to note that the construction and operation of a solar facility can occur in tandem with crop production.
- The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy, in line with national policy regarding energy generation.
- The water requirement for a solar facility is negligible compared to the levels of water used by coal-based technologies. This generation technology is therefore supported in dry climatic areas.
- South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. Mutsho Solar PV3 will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of Mutsho Solar PV3 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level can be appropriately managed and minimised, the benefits of the project are expected to partially offset the localised environmental costs of the solar facility, provided that the mitigation measures, as recommended by the specialists are adhered to.

11.5. Overall Conclusion (Impact Statement)

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using solar as the preferred technology, due to the availability of a strong solar resource, available grid capacity, benign topography, and good access. A technically viable development footprint was proposed by the developer considering environmental sensitivities identified in the scoping study and assessed as part of the EIA process. The assessment of the development footprint within the project site was undertaken by independent specialists and their findings have informed the results of this EIA 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 specialist findings from the EIA studies undertaken have indicated that there are no identified fatal flaws associated with the implementation of the development footprint within the project site subject to implementation of the recommended mitigation measures. Although the proposed layout for the PV facility and associated infrastructure overlaps with areas of sensitivity, the specialists have concluded that the project as proposed can be authorised on condition that the recommended mitigation measures are implemented. . Impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. The layout assessed within this EIA Report is therefore considered to be acceptable for implementation.

As detailed in the cost-benefit analysis, the benefits of Mutsho Solar PV3 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level can be appropriately managed and minimised, the benefits of the project are expected to partially offset the localised environmental costs of the solar facility. From a social perspective, both positive and negative impacts are expected. The implementation of 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 Mutsho Solar PV3.

Through the assessment of the development footprint within the project site, it can be concluded that the development of Mutsho Solar PV3 will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

11.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer and the potential to minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that Mutsho Solar PV3 is acceptable within the landscape and can reasonably be authorised subject to implementation of the refined optimised facility layout and the mitigation and enhancement measures recommended by the specialists.

Mutsho Solar PV3 with a contracted capacity of up to 100MW includes the following infrastructure (to be included within an authorisation issued for the project):

- Solar PV array comprising PV panels and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- 33/132kV onsite substation (IPP Portion), including associated equipment and infrastructure – the onsite substation will be completely constructed as part of phase 1 (i.e., as part of Mutsho Solar PV1) but only equipped for the first 100MW. When such a time comes that the next 100 MW is constructed, the existing substation will be equipped for the additional 100MW generation capacity (i.e., additional transformers, extending the busbars, etc.). This approach will be followed as each 100MW facility is added to the cluster.
- Electrical and auxiliary equipment required at the Collection Station that serves the solar energy facility, including a switchyard/bay, control building, fences, etc.
- Cabling from the onsite substation to the Collection Station (either underground or overhead).
- Site offices, warehouses, and guardhouses.
- Water storage tanks at admin block for human consumption.
- Laydown areas.
- Internal gravel distribution roads

The following key conditions would be required to be included within an authorisation issued for Mutsho Solar PV3:

- All mitigation measures detailed within this EIA Report, as well as the specialist reports contained within **Appendices D to L** are to be implemented.
- The EMPrs (for the facility and onsite substation) as contained within **Appendix K** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the solar facility in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of Mutsho Solar PV3 is considered key in achieving the appropriate environmental management standards as detailed for this project.
- Following the final design of Mutsho Solar PV3, a final layout must be submitted to DFFE for review and approval prior to commencing with construction. Micro-siting must take all recommended mitigation measures into consideration. No development is permitted within the identified no-go areas as detailed in **Figure 11.2**.
- 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 monitor compliance for the duration of the construction phase.
- Preconstruction walk-through of the final development footprint must be undertaken for protected species that would be affected and that can be translocated must be undertaken. The survey must also cover sensitive habitats and species that are required to be avoided. Permits from the relevant provincial authorities, will be required to relocate and/or disturb listed plant species.
- Prevent birds from nesting in substation infrastructure through exclusion covers or spikes if required (determined on a case-by-case basis).
- All other relevant environmental permits must be obtained prior to the construction of the facility.

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

CHAPTER 12: REFERENCES

Ecology Impact Assessment

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J & de Villiers, M.S. (Eds). 2014. Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. South African Biodiversity Institute, Pretoria.

BGIS (Biodiversity GIS). (2017). http://bgis.sanbi.org/

BODATSA-POSA. (2021). Plants of South Africa - an online checklist. POSA ver. 3.0. http://newposa.sanbi.org/.

Boycott, R. and Bourquin, R. 2000. The Southern African Tortoise Book – A Guide to Southern African Tortoises, Terrapins and Turtles. Revised Edition. Hilton. 228 pages.

Branch, W.R. (1998). Field Guide to Snakes and Other Reptiles of Southern Africa. Struik, Cape Town.

Department of Water Affairs and Forestry (DWAF) 2005. Final draft: A practical field procedure for identification and delineation of wetlands and Riparian areas.

Du Preez, L. & Carruthers, V. (2009) A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.

EWT. (2016). Mammal Red List 2016. www.ewt.org.za

Fish, L., Mashau, A.C., Moeaha, M.J. & Nembudani, M.T. (2015). Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions. SANBI, Pretoria.

IUCN. (2021). The IUCN Red List of Threatened Species. www.iucnredlist.org

Jenkins, A.R., Shaw, J.M., Smallie, J.J., Gibbons, B., Visagie, R. & Ryan, P.R. 2011. Estimating the impacts of power line collisions on Ludwig's Bustards Neotis ludwigii. Bird Conservation International 21: 303-310.

Johnson, S. & Bytebier, B. (2015). Orchids of South Africa: A Field Guide. Struik publishers, Cape Town.

Kotze DC, Marneweck GC, Batchelor AL, Lindley DC, Collins, NB. 2008. A Technique for rapidly assessing ecosystem services supplied by wetlands. Mondi Wetland Project.

Land Type Survey Staff. (1972 - 2006). Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Macfarlane, D.M., Kotze, D.C., Ellery, W.N., Walters, D., Koopman, V., Goodman, P. Goge, C. 2008. WET-Health, A technique for rapidly assessing wetland health.

Macfarlane, D.M., Dickens, J. & Von Hase, F. (2009). Development of a methodology to determine the appropriate buffer zone width and type for developments associated with wetlands, watercourses and estuaries.

Martin, G. R. & Shaw, J. M. 2010. Bird collisions with power lines: Failing to see the way ahead? Biological Conservation 143: 2695-2702.

Mucina, L. & Rutherford, M.C. (Eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria, South African.

Mucina, L., Rutherford, M.C. & Powrie, L.W. (Eds.). 2007. Vegetation map of South Africa, Lesotho and Swaziland. 1:1 000 000 scale sheet maps. 2nd ed. South African National Biodiversity Institute, Pretoria.

Nel JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Ollis DJ, Snaddon CD, Job NM, and Mbona N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria.

Raimonde, D. (2009). Red list of South African Plants. SANBI, Pretoria.

Rountree MW and Kotze, DM. 2013. Manual for the Rapid Ecological Reserve Determination of Inland Wetlands (Version 2.0). Joint Department of Water Affairs/Water Research Commission Study. Water Research Commission, Pretoria.

SADAP (South Africa Protected Areas Database) and SACAD (South Africa Conservation Areas Database) (2021). http://egis.environment.gov.za

SANBI. 2013. Grasslands Ecosystem Guidelines: landscape interpretation for planners and managers. Compiled by Cadman, M., de Villiers, C., Lechmere-Oertel, R. and D. McCulloch. South African National Biodiversity Institute, Pretoria. 139 pages.

SANBI-BGIS. 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Soil Classification Working Group. (1991). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

South African National Biodiversity Institute (SANBI). 2009. Further Development of a Proposed National Wetland Classification System for South Africa. Primary Project Report. Prepared by the Freshwater Consulting Group (FCG) for the South African National Biodiversity Institute (SANBI).

Van Deventer, H., Smith-Adao, L., Collins, N.B., Grenfell, M., Grundling, A., Grundling, P-L., Impson, D., Job, N., Lötter, M., Ollis, D., Petersen, C., Scherman, P., Sieben, E., Snaddon, K., Tererai, F. and Van der Colff D. 2019. South African National Biodiversity Assessment 2018: Technical Report. Volume 2b: Inland Aquatic (Freshwater) Realm. CSIR report number CSIR/NRE/ECOS/IR/2019/0004/A. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6230.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa.

Avifauna Impact Assessment

Bathusi Environmental Consulting cc (2018). Terrestrial Biodiversity EIA assessment for the proposed Mutsho Power Project near Makhado, Limpopo Province. Reference Number SVE – MPS – 2018/07, Version 2018.04.12.03.

BirdLife International. 2015a. Afrotis afra. The IUCN Red List of Threatened Species 2015: e.T22691975A93331501. http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22691975A93331501.en.

BirdLife South Africa. (2017). Important Bird Areas Factsheet. http://www.birdlife.org

Birdlife South Africa (2017b). Birds and Solar Energy Best Practice Guidelines. https://www.birdlife.org.za/wp-content/uploads/2020/03/BLSA-Guidelines-Solar-and-Energy.pdf

Birdlife South Africa (2015). Fences & birds, minimising unintended impacts. https://www.birdlife.org.za/what-we-do/landscape-conservation/what-we-do/birds-and-fences/

Coordinated Avifaunal Roadcounts (CAR) (2020). http://car.birdmap.africa/index.php

Del Hoyo, J., Collar, N.J., Christie, D.A., Elliott, A., Fishpool, L.D.C., Boesman, P. & Kirwan, G.M. (1996). HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 2: Passerines. Lynx Editions and BirdLife International, Barcelona, Spain and Cambridge, UK.

Eskom. (2015). Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds).The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (Eds). (2005). Roberts – Birds of Southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Horvath, G., Blaho, M., Egri A., Kriska, G., Seres, I. & Robertson, B. 2010. Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects Conservation biology 24 (6) 1644-1653

IUCN. (2021). The IUCN Red List of Threatened Species. www.iucnredlist.org

Jenkins, A.R., van Rooyen, C.S., Smallie, J.J., Harrison., J.A., Diamond., M., Smit-Robinson., H.A. & Ralston., S. (2015). Birds and Wind-Energy Best-Practice Guidelines. Birds and Wind-Energy Best-Practice Guidelines.

Lovich, J.E. & Ennen, J.R. (2011). Wildlife conservation and solar energy development in the desert southwest, United States. BioScience 61:982-992

Pachnoda Consulting (2018). Avifaunal aspects of the receiving environment, avifaunal impact assessment, mitigation recommendations and EMPr contributions. In: Bathusi Environmental Consulting cc (2018). Terrestrial Biodiversity EIA assessment for the proposed Mutsho Power Project near Makhado, Limpopo Province. Reference Number SVE – MPS – 2018/07, Version 2018.04.12.03.

SADAP (South Africa Protected Areas Database) and SACAD (South Africa Conservation Areas Database) (2021). http://egis.environment.gov.za

SANBI-BGIS. 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa.

Visser, Elke & Perold, V. & Ralston-Paton, S. & Cardenal, A. C. & Ryan, P.G., 2019. "Assessing the impacts of a utility-scale photovoltaic solar energy facility on birds in the Northern Cape, South Africa," Renewable Energy, Elsevier, vol. 133(C), pages 1285-1294.

Soil Compliance Statement

Land Type Survey Staff. (1972 - 2006). Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Mucina, L. & Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.

Smith, B. (2006). The Farming Handbook. Netherlands & South Africa: University of KwaZulu-Natal Press & CTA.

Soil Classification Working Group. (1991). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Soil Classification Working Group. (2018). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Heritage Impact Assessment

ALMOND, J., PETHER, J, and GROENEWALD, G. 2013. South African National Fossil Sensitivity Map. SAHRA and Council for Geosciences. Schweitzer et al. (1995) pp p288.

ANDERSON, J.M., ANDERSON, H.M., 1985. Palaeoflora of Southern Africa: Prodromus of South African megafloras, Devonian to Lower Cretaceous. A.A. Balkema, Rotterdam. 423 pp.

BARKER, O.B., BRANDL, G., CALLAGHAN, C.C., ERIKSSON., VAN DER NEUT, M., 2006. The Soutpansberg and Waterberg Groups and the Blouberg Formation. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp301-318.

CAWTHORN, R.G., EALES, H.V., WALRAVEN, F., UKEN, R. & WATKEYS, M.K. 2006. The Bushveld Complex. In: Johnson. M.R., Anhaeusser, C.R. & Thomas, R.J. (eds.) The geology of South Africa, pp. 261-281. Geological Society of South Africa, Johannesburg & the Council for Geoscience, Pretoria.

Cowan, R., 1995. History of Life. 2nd Edition. Blackwell scientific Publications, Boston. 462pp. EALES, H.V. 2001. A first introduction to the geology of the Bushveld Complex and those aspects of South African geology that relate to it, 84 pp. Council for Geoscience, Pretoria.

ERIKSSON, P.G., SCHWEITZER, J.K., BOSCH, P.J.A., SCHREIBER, U.M., VAN DEVENTER, J.L.& HATTON, C.J. 1993. The Transvaal Sequence: an overview. Journal of African Earth Sciences (and the Middle East) 16, 25-51.

ERIKSSON, P.G., HATTINGH, P.J. & ALTERMANN, W. 1995. An overview of the geology of the Transvaal Sequence and Bushveld Complex, South Africa. Mineralium Deposita 30,98-111.

ERIKSSON, P.G., ALTERMANN, W. & HARTZER, F.J. 2006. The Transvaal Supergroup and its precursors. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp. 237-260. Geological Society of South Africa, Marshalltown.

Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M.,Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 461 – 499.

MCCARTHY, T & RUBIDGE, B. 2005. The Story of Earth Life: A southern African perspective on a 4.6-billion-year journey. Struik. Pp 33330

MacRae, C.S. 1988. Palynostratigraphic correlation between the Lower Karoo sequence of the Waterberg and Pafuri coal-bearing basins and the Hammanskraal plant macrofossil locality, Republic of South Africa. Memoirs Geological Survey of South Africa 75: 1–217.

MACRAE, C. 1999. Life etched in stone. Fossils of South Africa. 305 pp. The Geological Society of South Africa, Johannesburg.

NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999). Republic of South Africa. http://www.dac.gov.za/sites/default/files/Legislations.

SAHRA 2013. Minimum standards: palaeontological component of heritage impact assessment reports, 15 pp. South African Heritage Resources Agency, Cape Town.

SNYMAN, C.P., 1998. Coal. In: Wilson, M.G.C., and Anhaeusser, C.P., (Eds) The Mineral Resources of South Africa: Handbook, Council for Geosciences 16, 136-205.

Visual Impact Assessment

Bernard Oberholzer. Guidelines for involving visual and aesthetic specialists in EIA processes, Published by the Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning, 2005

Landscape Institute and Institute of Environmental Assessment and Management, Guidelines for landscape and visual impact assessment (third edition), authors; published by E & FN Spon, 2013.

Mucina, L. & Rutherford, M.C. (eds.), 2006, The vegetation of South Africa, Lesotho and Swaziland (Strelitzia series; no. 19), South African National Biodiversity Institute, Pretoria.

United States Department of the Interior, Bureau of Land Management, 2013.
Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach, US Federal Aviation Administration, 2015. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM Administered Lands.
Meister Consultants Group, 2014. Solar and Glare
Appendix 6, EIA Regulations (2014) as amended, promulgated under section 24 of the National Environmental Management Act, 107 of 1998. Department of Forestry Fisheries and the Environment.

Social Impact Assessment

Statistics South Africa. (2016). Community Survey. Retrieved September 12, 2018, from http://cs2016.statssa.gov.za/
Adrian, T., & Natalucci, F. (2020). COVID-19 Crisis Poses Threat to Financial Stability. Retrieved June 24, 2021, from :https://blogs.imf.org/2020/04/14/covid-19-crisis-poses-threat-to-financial-stability/
Department of Economic Development. (2011). The New Growth Path Framework.
Department of Economic Development, T. a. (2016). Formulation of Provincial Spatial Economic Development Strategy, Corridor and Nodal Framework and Data Mapping.
Department of Energy. (2013). Integrated Resource Plan for Electricity 2010-2030 Update Report.
Department of Energy. (2018). Integrated Resource Plan for Electricity 2018 Update Report.
Department of Energy. (2019). Integrated Resource Plan for Electricity 2010-2030 Update Report.
Department of Energy. (2022). Electricity Statistics and Backlog.
Department of Energy. (2022, April 04). Renewable Energy. Retrieved from Department of Energy: http://www.energy.gov.za/files/esources/renewables/r_solar.html#:~:text=Most%20areas%20in%20South%20Africa,has%20sunshine%20all%20year%20round.
Department of Energy. (2022). Renewable Energy Data and Information Services. The IPP Office, and Eskom.
Department of Minerals and Energy. (1998). White Paper on the Energy Policy of the Republic of South Africa. Republic of South Africa.
Department of Minerals and Energy. (2003). White Paper on Renewable Energy .
Department of Trade and Industry. (2016). Industrial Policy Action Plan 2016/17-2017/18.
Department of Trade and Industry. (2018). Industrial Policy Action Plan 2017/18-2020-2022.
Duvenage, A. (2020). City Press. Retrieved June 24, 2021, from https://city-press.news24.com/Business/what-the-moodys-downgrade-means-for-sa-20200330
e-SEK. (2020). Making sense of COVID-19's impact on South African businesses. Retrieved June 25, 2021, from https://www.itweb.co.za/content/wbrpOMgYbkEvDLZn
Goldberg, A. (2015). The economic impact of load shedding: The case of South African retailersGordon Institute of Business Science - University of Pretoria. Pretoria: Gordon Institute of Business Science - University of Pretoria.
International Institute for Sustainable Development. (2018). Strategies for just energy transitions. Manitoba: IISD.
JG Afrika. (2021). Proposed Hendrina Wind Energy Facility, Mpumalanga Transport Study.
Kovaleski, D. (2019). Study shows high investor confidence in renewable energy. Retrieved June 25, 2021, from https://dailyenergyinsider.com/news/20058-study-shows-high-investor-confidence-in-renewable-energy/
Lanz, J. (2020). Agricultural pre-EIA Assessment for proposed Hendrina, Camden East I, and Camden East II wind energy facilities in Mpumalanga.
Lekwa Local Municipality. (2021). Final Draft IDP.
Limpopo Provincial Government. (2005). Growth and Development Strategy.

Limpopo Provincial Government. (2009). Limpopo Employmnet, Growth and Development Plan.

Limpopo Provincial Government. (2015). Limpopo Development Plan.

Maree, D. (2019). Agribusiness South Africa. Retrieved March 9, 2022, from https://www.bizcommunity.com/Article/196/741/188061.html

McSweeney, R., & Timperley, J. (2018). The Carbon Brief Profile. Retrieved June 24, 2021, from https://www.carbonbrief.org/the-carbon-brief-profile-south-africa

Musina Local Municipality. (2022). Integrated Development Plan.

National Department of Energy (DOE). (2019). The South African Energy Sector Report. Pretoria: Department of Energy.

National Planning Commission. (2011). The National Development Plan, Vision for 2030.

NERSA. (2020). National Electricity Industry Regulation: A different focus on the electricity supply industry challenges and possible solutions. Pretoria: National Energy Regulator of South Africa.

NPC. (2012). National Development Plan: Vision for 2030.

Provincial Planning Commission. (2016). 2035 Provincial Growth and Development Plan, Building a Better Future Together.

REN21. (2019). The Renewables 2019 Global Status Report. Retrieved June 24, 2021, from http://www.ren21.net/gsr-2019/pages/foreword/foreword/

Renewables 2021. (2021). Renewables 2021 Global Status Report. REN21.

Republic of South Africa. (1996). Constitution of the Republic of South Africa.

SACCI. (2022). Business Confidence Index.

Santander. (2020). South Africa: Foreign investment. Retrieved June 24, 2021, from https://santandertrade.com/en/portal/establish-overseas/south-africa/foreign-investment

Sihlobo, W., & Kapuya, T. (2021). Daily Maverick. Retrieved March 9, 2022, from https://www.dailymaverick.co.za/article/2021-11-08-rising-domestic-and-international-agricultural-input-costs-set-to-squeeze-both-farmers-and-consumers/

Sinding, S. (2009, May 16). Population, poverty and economic development. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2781831/

SiVEST. (2021). Proposed Construction of the Hendrina Renewable Energy.

South African Government. (2011). New Growth Path Framework .

Statistics South Africa. (2011). Census. Pretoria: Statistics South Africa.

StatsSA. (2021). Department of Statistics South Africa. Retrieved March 15, 2022, from http://www.statssa.gov.za/?p=14660

Swart, P., & Goncalves, S. (2020). Downgrade of South Africa's credit rating further into junk. Retrieved June 23, 2021, from https://www.cliffedekkerhofmeyr.com/en/news/publications/2020/finance/finance-alert-11-may-downgrade-of-south-africas-credit-rating-further-i

Trade & Industry Policy Strategies. (2021). Making sense of jobs in South Africa's just energy transition: Managing the impact of a coal transition on employment. South Africa: TIPS.

van Wyk, C. (2020). SA's "big bazooka" stimulus package explained. Retrieved June 24, 2021, from https://www.investec.com/en_za/focus/economy/sas-big-bazooka-stimulus-package-explained.html

van Wyk, M. (2018). SABC News. Retrieved March 9, 2022, from https://www.sabcnews.com/rise-in-fuel-price-to-negatively-affect-agricultural-sector/

Vhembe District Municipality. (2021). IDP.

World Wildlife Fund. (2014). Renewable Energy Vision 2030 South Africa, Climate Change and Energy, Technical Report. WWF.