

Harmony Joel Solar PV Facility

Free State Province

Final Scoping Report

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PROJECT DETAILS

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PURPOSE OF THE SCOPING REPORT AND INVITATION TO COMMENT

Freegold Harmony (Pty) Ltd has appointed Savannah Environmental as the independent environmental consultant to undertake the Scoping and Environmental Impact Assessment Process for the Harmony Joel Solar PV Facility. The EIA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998). This Scoping report has been compiled in accordance with Appendix 2 of the EIA Regulations, 2014 (as amended) and consists of the following sections:

This Scoping Report represents the findings of the Scoping Phase of the EIA process and contains the following chapters:

- » **Chapter 1** provides background to the Harmony Joel Solar PV Facility project and the environmental impact assessment.
- » **Chapter 2** provides a project description of the Harmony Joel Solar PV Facility project.
- » **Chapter 3** provides the site selection information and identified project alternatives.
- » **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed facility as well as the need and desirability of Harmony Joel Solar PV Facility.
- » **Chapter 5** outlines the process which was followed during the scoping phase of the EIA process.
- » **Chapter 6** describes the existing biophysical and social environment within and surrounding the study and development area.
- » **Chapter 7** provides an identification and evaluation of the potential issues associated with the proposed solar PV facility and associated infrastructure.
- » **Chapter 8** presents the conclusions of the scoping evaluation for the Harmony Joel Solar PV Facility .
- » **Chapter 9** describes the Plan of Study (PoS) for the EIA phase.
- » **Chapter 10** provides references used to compile the Scoping report.

The Scoping Report was made available for a 30-day review and comment period from **14 November 2022 to 14 December 2022** on the Savannah Environmental Website (<https://savannahsa.com/public-documents/energy-generation/>). All comments received during the 30-day review and comment period have been included, considered and addressed within this Final Scoping report for the consideration of the DESTEA.

EXECUTIVE SUMMARY

Freegold Harmony (Pty) Ltd (a subsidiary of Harmony Gold Mining Company Ltd) is looking to supplement its energy supply by implementing Photovoltaic (PV) generation, aiding their transition to a more sustainable and environmentally friendly energy mix.

The development of a solar photovoltaic (PV) facility with a generating capacity of up to 18MW is proposed ~20km north east of the town of Theunissen within the Masilonyana Local Municipality and within the Lejweleputswa District Municipality, Free State Province. The PV facility is located on Portion 0 of the Farm Leeuwbult 580 and is owned by the Mine. The solar PV development will be known as Harmony Joel Solar PV Facility

The preferred site for the project is on properties which are owned by the Mine and are available for the proposed project and is therefore deemed technically feasible by the project developer for such development to take place.

A project site considered to be technically suitable for the development of the solar PV facility, with an extent of approximately 1000ha, was identified. A development area of ~220 ha was demarcated within this project site and allows an adequate footprint for the installation of a solar PV facility with a contracted capacity of up to 18MW, while allowing for the avoidance of environmental site sensitivities.

The full extent of the project site is to be evaluated in the Scoping phase to identify sensitivities. Site-specific studies and assessments will delineate areas of potential sensitivity within the identified study area. Once constraining factors have been confirmed, the layout of the solar PV facility within the development area can be planned to avoid sensitive environmental areas and features.

The infrastructure associated with the 18MW solar PV facility will include:

- » PV modules and mounting structures.
- » Inverters and transformers a SCADA room, and maintenance room.
- » Cabling between the project components, to be laid underground where practical.
- » Access roads, internal roads and fencing around the development area.
- » Temporary and permanent laydown areas.
- » Grid connection solution which will tie-in to Shafts 1 & 2 HJ Joel Mining Substation (located ~850m south west of the project site) via a 1.2km power line.

The site is accessible via the R30 and then the A169 mine access road.

As of 2019, the Industrial sector was the leading electricity consumer in South Africa, with up to 56 percent of the total consumption (Ratshomo 2019). Mining and quarrying accounted for 10% of the industrial consumption (Chamber of Mines of South Africa, 2017). The successful development of the renewable energy project will enable Harmony Gold to make a valuable and meaningful contribution towards growing the green economy within the Free State Province and South Africa. This will assist the Free State in creating green jobs and reducing Green House Gas emissions, while reducing the energy demand on the Eskom national grid.

Sensitivity Analysis for the Development Area and Grid Connection Corridor

This section considers the sensitive features located within the development area, as identified by the independent specialists, and also indicates the locations of the sensitive features within the development area.

The potentially sensitive areas which have been identified through the scoping study are listed below and illustrated in **Figure 1**. The detail is based on the desktop review of available baseline information for the project site, as well as the sensitivity data from specialist studies undertaken during the scoping phase, which included limited field surveys. During the site and desktop surveys, the affected area was investigated in sufficient detail in order to provide definitive insight into the potential for constraining factors on the site. The sensitivity map must be used as a tool by the developer to avoid any areas flagged to be of higher risk or sensitivity and inform the location/layout of the development footprint for the facility and associated infrastructure. The development footprint is the area which will be assessed further in detail in the EIA Phase, in order to provide an assessment of environmental acceptability and suitability of the facility layout of the Harmony Joel Solar PV Facility.

Ecological and Freshwater Sensitive Features

Signs and tracks of mammals are present on the site but notably less when compared to the natural condition. This is most likely a consequence of the proximity of the mining operations and frequent human activities in the area. Being dominated by natural vegetation the site itself will therefore still have capacity for a natural mammal population though the actual mammal population will be smaller and dominated by generalist species. Rare and endangered mammals are often reclusive and avoid areas in close proximity to human activities and are also dependent on habitat in pristine condition. Such species are therefore considered unlikely to occur in the area though the Doring River may still provide suitable habitat for Cape Clawless Otter (*Aonyx capensis*) though should remain largely unaffected by the development as long as the development footprint is kept outside the 1:100 year flood line of the river.

Wetland and riparian habitats also generally provide a higher abundance of resources and subsequently are also able to sustain a diverse and large mammal population. This will also be the case for the Doring River adjacent to the site. It is therefore also important that this system not be affected by the development. As long as the development footprint is kept outside the 1:100 year flood line of the river, the impact on the mammal population along the river should remain low.

The mammal survey of the site was conducted by means of active searching and recording any tracks or signs of mammals and actual observations of mammals. From the survey the following actual observations of mammals were recorded:

- » Soil mounds of the Common Mole Rat (*Cryptomys hottentotus*) were common in most areas of the study area. This is a widespread species which has even become adapted to urban areas. It is a generalist species anticipated to occur in this area.
- » Scat and burrows of Yellow Mongoose (*Cynictis penicillata*) occur in the study area. This species is widespread and common and found in most natural or disturbed habitats.

Several burrows of small mammals were noted which could not be identified but do indicate a significant mammal population in the area.

- » Observation of a Steenbok (*Raphicerus campestris*). This species is widespread but confined to fairly natural or agricultural areas and generally avoid urban areas.
- » An active burrow of Aardvark (*Orycteropus afer*) occurs in the study area. This is also a fairly widespread and common species but is highly reclusive and is also listed as a protected species and is therefore of significant conservation value.

These species identified on the site indicate only a moderate species diversity of largely widespread and generalist species and is indicative of a modified natural mammal population. A similar mammal population should also be able to re-establish in the solar development footprint after construction has taken place.

The most significant impact on mammals anticipated on the site itself is primarily concerned with the loss and fragmentation of available habitat. Transformation of the natural vegetation on the site will result in a decrease in the population size as available habitat decreases. As indicated, the site does still consist of natural vegetation though it is still fairly uniform and with moderate habitat diversity and consequently the mammal population is also not anticipated to be diverse. The impact on the loss of habitat would therefore be significant but is unlikely exceed high values. In addition, extensive natural areas still remain in the surroundings into which mammals on the site move to without resulting in high habitat pressures.

It is also considered likely that several mammal species were overlooked during the survey, and it may also be likely that other rare and endangered species may be present on the site.

Avifauna Sensitive Features

Three avifaunal habitat types were identified on the study site and surroundings, ranging from open savannoid grassland with bush clump mosaics, the Doring river and associated tributaries transformed areas. A total of 158 bird species have been recorded within the study area, including four Red listed species (threatened and near threatened species).

In addition, a total of 41 collision-prone bird species have been recorded from the study area (*sensu atlas data*), of which 28 species were waterbird and shorebird taxa and another seven species were birds of prey. However, the respective habitat types also provided habitat for at least 30 % of the regional near-endemic bird composition.

The following preliminary avifauna sensitivities have been identified:

- » Areas of high sensitivity
 - Sensitive ecosystems with either low inherent resistance or low resilience towards disturbance factors or highly dynamic systems considered important for the maintenance of ecosystem integrity. Most of these systems represent ecosystems with high connectivity with other important ecological systems OR with high species diversity and usually provide suitable habitat for a number of threatened or rare species. These areas should preferably be protected;
 - include the nearby Doring River and its tributaries and the proposed buffer zones (500m).
 - The Doring River system provides foraging habitat for a number of waterbird taxa (mainly waterfowl of the genera *Anas*, *Alopochen*, *Tadorna* and *Plectropterus*), of which these taxa may collide with the proposed PV panels and infrastructure when dispersing (especially when dispersing towards nearby impoundments, dams and inundated wetland features). More importantly, the linear configuration of the Doring River and its associated tributaries are important flyways for waterbird

taxa in the region, and should preferably be buffered by at least 500m to avoid or minimise the risk of these bird interacting with the proposed PV infrastructure.

» Areas of medium sensitivity

- These are slightly modified systems which occur along gradients of disturbances of low-medium intensity with some degree of connectivity with other ecological systems OR ecosystems with intermediate levels of species diversity but may include potential ephemeral habitat for threatened species;
- Areas of medium sensitivity represent habitat units of open savannoid grassland and bush clump mosaics. These habitat types provide ephemeral foraging habitat for certain threatened bird species (e.g. Secretarybird), as well as terrestrial bird species (e.g. Northern Black Korhaan) with the potential to interact (e.g. collide) with the proposed electrical infrastructure. However, reporting rates for threatened bird species was relatively low, thereby suggesting a medium sensitivity rating instead of a high sensitivity even though the majority of the habitat units is natural.

» Areas of low sensitivity

- Degraded and highly disturbed/transformed systems with little ecological function and are generally very poor in species diversity (most species are usually exotic or weeds).
- Areas of low sensitivity include habitat units represented by transformed types and mining infrastructure, thereby contributing little towards local biodiversity.

Soils and Agricultural Potential Sensitive Features

The development area has been used for livestock farming, but it is assumed that the cattle grazing belongs to the local community nearby. The current landowner (Harmony) indicated that they do not have an agricultural activity on the properties. The soil and agricultural sensitivity of the site therefore varies between low and moderate, depending on the soil properties, topography and other landscape features of the development area.

No sensitivity higher than Medium has been identified for the proposed development

» Medium Agricultural Sensitivity:

- Various different soil types such as Bonheim, Valsrivier, and Swartland have been identified on site.

No crop cultivation has taken place within the development area. The soil and agricultural sensitivity of the site therefore varies between low and moderate, depending on the soil properties, topography and other landscape features of the development area.

No no-go areas have been identified for the proposed project from the perspective of soil and agricultural resource conservation.

Heritage Sensitive Features, the Cultural Landscape (incl. Archaeology, Palaeontology, and Cultural Landscape)

The areas surveyed as part of this assessment have been transformed through agricultural interventions and/or mining activity. As such, it is not surprising that the results of the survey only identified two sites of scientific cultural value - JL2, graded IIIC and JL5 graded IIIB within the area proposed for the Joel PV development.

» No-Go Area:

- The 30m buffer area recommended around site JL2 is implemented

- The 50m buffer area recommended around site JL5 is implemented

These areas must be excluded from the proposed development footprint.

The preferred site lies on the potentially fossiliferous Adelaide Subgroup (Beaufort Group, Karoo Supergroup) and the alternative site lies on moderately sensitive sands and alluvium of the Quaternary. The area has been greatly disturbed by farming and mining activities and no vertebrate fossils have been reported. According to the new biostratigraphy map, this is probably the *Daptocephalus* Assemblage Zone. No potential traps for Quaternary fossils (pans) are visible from the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once excavations have commenced.

Social Sensitive Features

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

Typically, major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income and will be similar to the impacts during the construction phase associated with construction activities. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. The impact of the decommissioning phase is expected to be negligible due to the small number of permanent employees affected. The potential impacts associated with decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling program. With mitigation, the impacts are assessed to be Low (negative).

Visual Sensitive Features

The traversing unnamed road is anticipated to have the highest visual impact relating to the solar PV facility; however, the area is still surrounded by mining activities and therefore the solar PV will not impact the sense of place

A 10km radius from the project area was evaluated. The surrounding area comprises mostly of agricultural land, mining activities and to the north industrial and residential activities from the town of Welkom. The natural vegetation in the study area is dominated by two types of grasslands: the Vaal-Vet Sandy Grassland and the Highveld Alluvial Grassland. Much of these grasslands have been degraded throughout the region. Most of it has been transformed for cultivation and the rest under strong grazing pressure from cattle and sheep.

The area is located within a typical Highveld climate with moderately wet, warm summers and cold dry winters. The regional topography of the Northern Free State can be described as relatively flat, with rolling

plains and low hills extending into the Welkom area. The rolling plain elevations range from 1 260m above mean sea level (amsl) to 1 460m amsl.

The most prominent (and visible) land use within the region is the mining activities, mining infrastructure and mine dumps. Interspersed with these mining activities are agricultural land uses, ranging from irrigated agriculture to the south-west and broader south and western area. Agricultural activities include the production of maize, wheat and sunflower crops, as well as cattle farming. The farmers working these fields predominantly reside at homesteads or farm residences scattered throughout the study area.

The N1 national road provides access to the region and is the main connecting route in between the Gauteng Province (Pretoria) and Welkom. The proposed PV facility site is accessible from both the M3 and the R730 via secondary roads.

Besides the large number of mines and mining infrastructure within the study area, there are numerous power lines and substations, predominantly associated with the mine. The proposed Harmony Joel Solar PV Facility is located approximately 5.5km north west of a small local landing strip.

Overall Conclusion and Fatal Flaw Analysis

The potentially sensitive areas which have been identified through the environmental scoping study are illustrated in **Figure 1**. The scoping phase sensitivity map provides an informed estimate of the sensitivity of the development area (outlined in Dark Blue). The findings of the Scoping Study indicate that no environmental fatal flaws are associated with the Harmony Joel Solar PV project. While areas of high and very high sensitivity have been identified, it is anticipated that avoidance of these areas and/or the implementation of appropriate mitigation measures would assist in reducing the significance of impacts to acceptable levels. It is, therefore, recommended, that the development footprint for the development of the facility be outside of those areas identified as very high sensitivity (no-go areas) and high sensitivity as far as possible in order to ensure that the development does not have a detrimental impact on the environment. This forms part of the 'funnel-down approach' for the identification of an appropriate development footprint within the development area. Even with the appropriate avoidance of sensitive areas, there is an adequate area within the project site which can accommodate the development footprint for a 18MW facility, with relatively low impacts on the environment. This identified area is referred to as the development footprint and is demarcated with an Orange Polygon on **Figure 1**. A 200m wide grid connection corridor is also demarcated as a Turquoise Outline.

With an understanding of which areas within the development area and grid connection corridor are considered sensitive to the development of the proposed facility, the Applicant is able to design a detailed infrastructure layout for consideration by all relevant specialists in the EIA Phase. During the EIA phase, more detailed environmental studies will be conducted in line with the Plan of Study for EIA. These studies will consider the detailed facility layout produced by the Applicant and make recommendations for the implementation of avoidance strategies (if required), and mitigation and management measures to ensure that the final assessed layout retains an environmental impact within acceptable limits. The sensitivity map will be further refined in the EIA phase on the basis of these specialist studies, in order to provide an assessment of environmental acceptability of the final design of the facility.

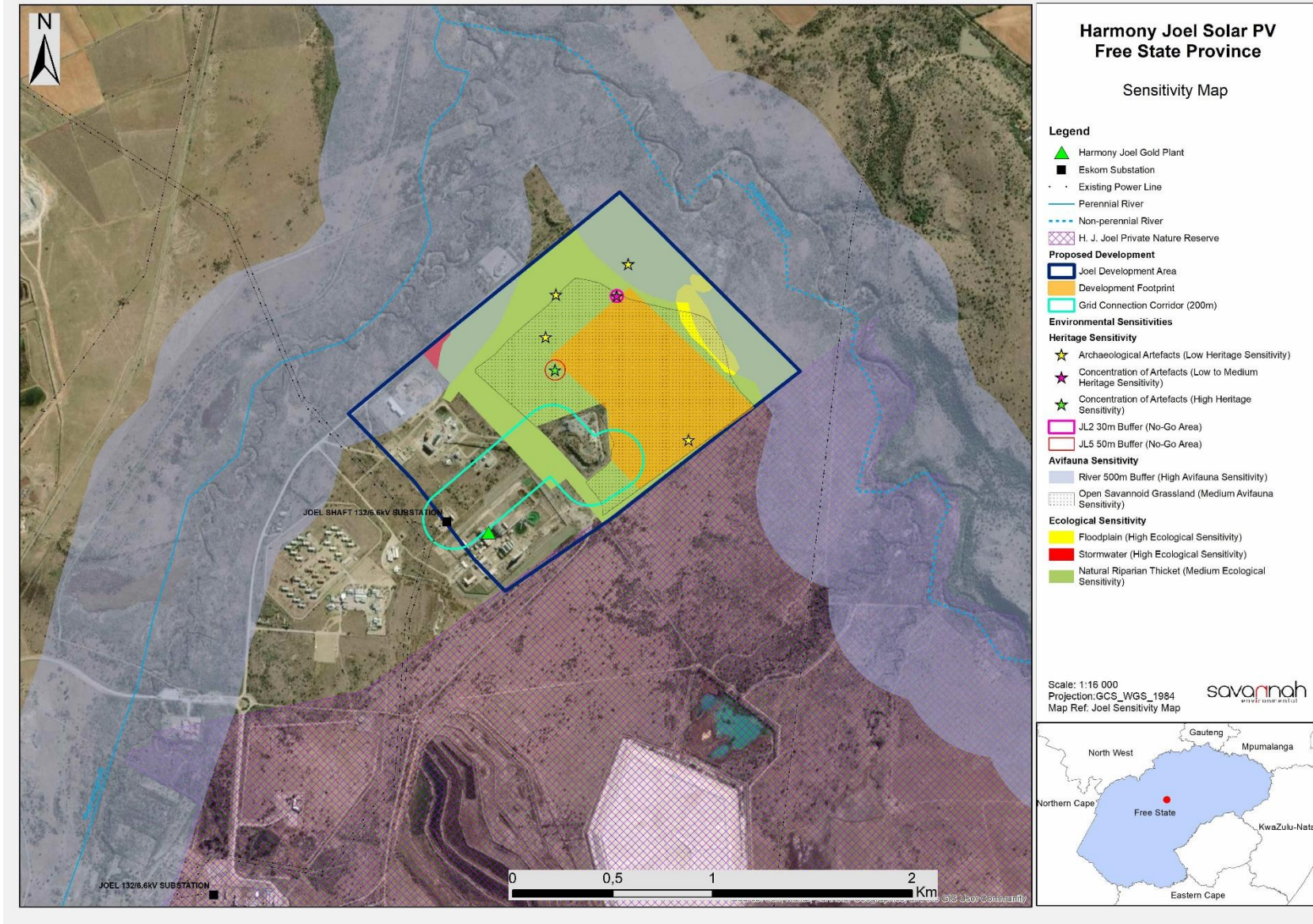


Figure 1: Map indicating the environmental sensitivities associated with the Harmony Joel Solar PV Facility.

DEFINITIONS AND TERMINOLOGY

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

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.

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 the Harmony Joel Solar PV Facility 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 the Harmony Joel Solar PV Facility 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.

'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 1000ha, within which the Harmony Joel Solar PV Facility 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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CHAPTER 1: INTRODUCTION

Freegold Harmony (Pty) Ltd (a subsidiary of Harmony Gold Mining Company Ltd) is looking to supplement its energy supply by implementing Photovoltaic (PV) generation at their Mine site, aiding their transition to a more sustainable and environmentally friendly energy mix at the existing Joel Operations. A solar PV facility with a generating capacity of 18MW is proposed to the north-east of the Harmony Joel operations. The site is approximately ~20km north-east of the town of Theunissen within the Masilonyana Local Municipality and within the Lejweleputswa District Municipality, Free State Province (refer to **Figure 1.1**).

The PV facility is located on Portion 0 of the Farm Leeuwbult 580, which is owned by the Mine but outside of the mining area (the project would not impact on mining activities).

A project site considered to be technically suitable for the development of the solar PV facility, with an extent of approximately 1000ha, was identified by Freegold Harmony (Pty) Ltd. A development area of ~220ha was demarcated within this project site following an initial screening of environmental sensitivities. The development area allows an adequate footprint for the installation of a solar PV facility with a contracted capacity of up to 18MW, while allowing for the avoidance of environmental site sensitivities.

The full extent of the project area is to be evaluated in the Scoping phase. Site-specific studies and assessments will delineate areas of potential sensitivity within the identified project site. Once constraining factors have been confirmed, the layout of the solar PV facility within the development area can be planned to avoid sensitive environmental areas and features.

The relative location of the project site, development area and the grid connection corridor are indicated in **Figure 1.1**

From a local perspective, the Mine site within the greater Theunissen area is considered favourable for the development of a solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the availability of a grid connection, and the availability of land on which the development can take place.

As of 2019, the Industrial sector was the leading electricity consumer in South Africa, with up to 56 percent of the total consumption (Ratshomo, 2019). Mining and quarrying accounted for 10% of the industrial consumption (Chamber of Mines of South Africa, 2017). The successful development of the renewable energy project will enable Harmony Gold to make a valuable and meaningful contribution towards growing the green economy within the Free State Province and South Africa. This will assist the Free State in creating green jobs and reducing greenhouse gas emissions, while reducing the energy demand on the Eskom national grid.

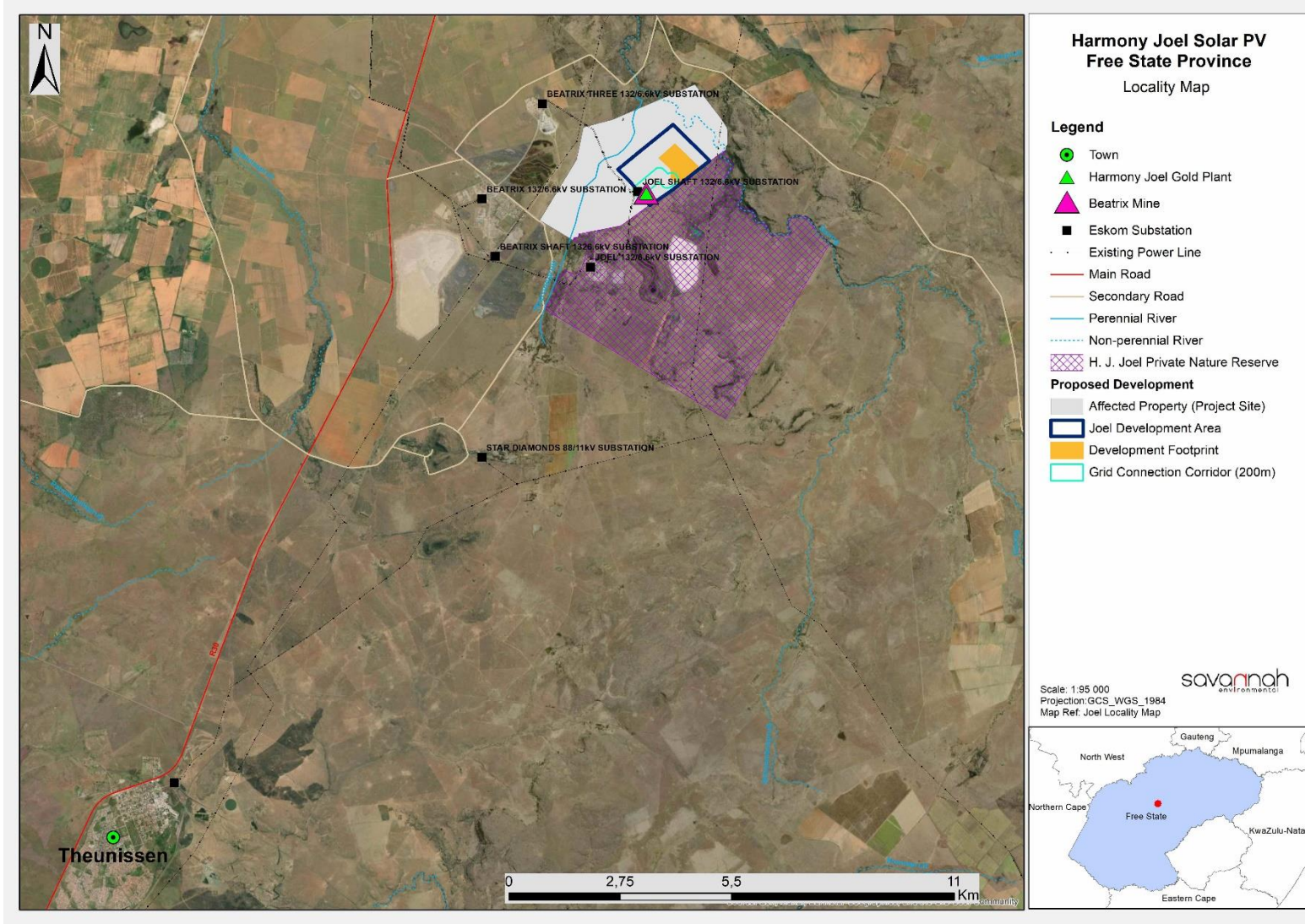


Figure 1.1: Locality map illustrating the location of the Harmony Joel Solar PV Facility project site and associated infrastructure (refer to **Appendix I**).

1.1. Project Overview

The construction of a dedicated Solar PV facility at the Harmony Joel Operations is proposed in order to reduce the Mine's consumption of grid-supplied power by using solar power. This would provide cost savings to the Mine and allow the mining operation to operate efficiently with uninterrupted power supply, while reducing the demand on the national grid. The Applicant, Freegold Harmony (Pty) Ltd will fund and own the PV plant which will generate energy for on-site consumption by the mining operations.

The project site¹ has been identified by the applicant as a technically feasible site which has the potential for the development of a solar PV facility. A development area² of approximately 220ha has been identified within the project site for the development of the Harmony Joel Solar PV Facility. The full extent of the development area has been considered within this Scoping Report 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 development area, a development footprint³ and facility layout will be defined based on the findings of the Scoping Study and will be further assessed during the EIA Phase. Therefore, the exact location of the development footprint within the development area for the Harmony Joel Solar PV Facility is not defined at this stage. The development footprint / facility layout is estimated to require an area of 220ha in extent (for the 18MW PV facility and all associated infrastructure), however the extent of the development footprint will be confirmed in the EIA Phase once the layout design is available. The development area is larger than the area needed for the development footprint of a 18MW PV facility, and therefore provides the opportunity for the optimal placement of the infrastructure, ensuring avoidance of major identified environmental sensitivities or constraints identified through this Scoping and EIA process.

Table 1.1: Detailed description of the project site

Province	Free State Province
District Municipality	Lejweleputswa District Municipality
Local Municipality	Masilonyana Local Municipality
Ward Number (s)	Ward 6
Nearest town(s)	Theunissen (20km South West)
Farm Portion(s), Name(s) and Number(s) associated with the PV Facility and grid connection	Portion 0 of the Farm Leeuwbult 580
SG 21 Digit Code (s) for all properties	F03300000000058000000
Current zoning	Mining
Current land use	Grazing (mainly cattle)
Project Site	~1000ha

¹ The project site comprises of affected properties for the identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the EIA process, within which indirect and direct effects of the project may occur.

² The development area is that identified area where the 18MW PV facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~220ha in extent.

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

PV Development Area	~220ha		
Site Coordinates (development area)		Latitude:	Longitude:
	Northern point	28° 14'53.46"S	26°50'00.40"E
	Eastern point	28° 15'05.94"S	26°50'16.52"E
	Southern point	28° 15'23.27"S	26°49'47.38"E
	Western point	28° 15'24.31"S	26°49'19.86"E
	Centre point	28° 15'16.60"S;	26°49'43.69"E

The development footprint will contain the following infrastructure for the 18MW Harmony Joel Solar PV Facility:

- » PV modules and mounting structures
- » Inverters and transformers a SCADA room, and maintenance room
- » Cabling between the project components, to be laid underground where practical
- » Access roads, internal roads and fencing around the development area.
- » Temporary and permanent laydown areas and O&M buildings.
- » Grid connection solution which will tie-in to Shafts 1 & 2 HJ Joel Mining Substation (located ~850m south west of the project site) via a 1.2km power line

The overarching objective for the Harmony Joel Solar PV Facility is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and maintenance costs, as well as potential social and environmental impacts. To meet these objectives, local level environmental and planning issues will be assessed through the EIA process with the aid of site-specific specialist studies to delineate areas of sensitivity within the identified project site. This will serve to inform and optimise the design of the solar PV facility.

1.2. Requirement for an Environmental Impact Assessment Process

Section 24 of South Africa's National Environmental Management Act (No. 107 of 1998) (NEMA) pertains to Environmental Authorisations (EA), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the Competent Authority. The 2014 (As amended in 2017) Environmental Impact Assessment (EIA) Regulations, as amended (GNR 326) published under NEMA prescribe the process to be followed when applying for Environmental Authorisation (EA), while the Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)) contain those activities which may not commence without Environmental Authorisation from the Competent Authority.

Various aspects of the Harmony Joel Solar PV Facility are listed as activities that may have a detrimental impact on the environment. The Harmony Joel Solar PV Facility requires Environmental Authorisation subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA), as prescribed in Regulations 21 to 24 of the 2014 (amended in 2017) EIA Regulations (GNR 326). The generated electricity will be for own-use by the Harmony Joel Mining Plant. As such, the project does not relate to the Integrated Resource Plan for Electricity (IRP) 2010 – 2030, and the Free State Department of Small Business Development, Tourism and Environmental Affairs (DESTEA) has been identified as the relevant Competent Authority for the application for environmental authorisation.

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

This Scoping 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 Scoping Report includes the following information required in terms of EIA Regulations, Appendix 2: Content of the Scoping Report

Requirement	Relevant Section
2(a)(i) the details of 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 .
2(b) the location of the activity, including (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties	The location of the Harmony Joel Solar PV facility has been 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 .
2(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is (i) a linear activity, a description, and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A locality map illustrating the location of the Harmony Joel Solar PV Facility has been included in Figure 1.1 . The centre point co-ordinates of the project site are included in Table 1.1 .

This Scoping Report consists of ten chapters, which include the following:

- » **Chapter 1** provides background to the Harmony Joel Solar PV Facility project and the environmental impact assessment.
- » **Chapter 2** provides a project description of the Harmony Joel Solar PV Facility project.
- » **Chapter 3** provides the site selection information and identified project alternatives.
- » **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed facility as well as describes the need and desirability of Harmony Joel Solar PV Facility
- » **Chapter 5** outlines the process which was followed during the scoping phase of the EIA process.
- » **Chapter 6** describes the existing biophysical and social environment within and surrounding the study and development area.
- » **Chapter 7** provides an identification and evaluation of the potential issues associated with the proposed solar PV facility and associated infrastructure.
- » **Chapter 8** presents the conclusions of the scoping evaluation for the Harmony Joel Solar PV Facility
- » **Chapter 9** describes the Plan of Study (PoS) for the EIA phase.
- » **Chapter 10** provides references used to compile the Scoping report.

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

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

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

- » The **Scoping Phase** includes the identification of potential issues associated with the project through a desktop study (considering existing information), limited field work, and consultation with interested and affected parties and key stakeholders. This phase considers the broader project site 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 **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.

1.5. Appointment of an Independent Environmental Assessment Practitioner (EAP)

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), the applicant has appointed Savannah Environmental (Pty) Ltd as the independent environmental 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 nor any of its specialists 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 leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) Contributor. Savannah Environmental's team have been actively involved in undertaking environmental studies since 2006, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development.

The Savannah Environmental team for this project includes:

- » **Chantelle Geyer** was the junior EAP on this project and the GIS Practitioner, she holds a BSc degree in Environmental Science, and a BSc Honours degree in Environmental Geology degree 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, and environmental management programmes.
- » **Karen Jodas** is Director at Savannah Environmental (Pty) Ltd and the project manager for the Harmony Gold projects, she holds a Master of Science Degree and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) and a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 25 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.
- » **Nicolene Venter**, 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.
- » **Jo-Anne Thomas** is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726) and is registered as 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.

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

1.6. Details of the Independent Specialist Team

In order to adequately identify and assess potential impacts associated with the project, a number of specialists have been appointed as part of the project team and have provided specialist input into this Scoping Report (refer to **Table 1.2**). CVs detailing the independent specialists' expertise and relevant experience are provided in **Appendix A**.

Table 1.2: Independent Specialists that contributed to the Scoping Report

Company	Specialist Area of Expertise	Specialist Name
DPR Ecologists and Environmental Services	Ecology and Wetlands	Darius Van Rensburg
Terra Africa Environmental Consultants	Soils and Agricultural Potential	Marinè Pienaar
Pachnoda Consulting	Avifauna	Lukas Niemand
CTS Heritage	Heritage and Palaeontology	Jenna Lavin
Eco Thunder Consulting	Visual	Brogan Geldenhuys
Eco Thunder Consulting	Social Environment	Brogan Geldenhuys

CHAPTER 2: PROJECT DESCRIPTION

This Chapter provides an overview of the Harmony Joel Solar PV Facility and associated infrastructure 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 a Scoping Report

This chapter of the Scoping Report includes the following information required in terms of The EIA Regulations, 2014, as amended - Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
3(b) the location of the activity including (i) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the proposed project is detailed in Chapter 1, Table 1.1 , as well as in section 2.2.1 .
3(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is	A locality and layout plan are provided in Chapter 1, Figure 1.1
3(d)(ii) a description of the scope of the proposed activity, including a description of the activities to be undertaken including associated structures and infrastructure	A description of the activities to be undertaken with the development of the project is included in Table 2.1 and Table 2.2 . A description of the associated infrastructure is included in Section 2.4 . Activities to be undertaken during the various project development phases is included in Section 2.6 .

2.2. Nature and Extent of the Harmony Joel Solar PV Facility

Freegold Harmony (Pty) Ltd is looking to supplement its energy supply by implementing Photovoltaic (PV) generation, aiding their transition to a more sustainable and environmentally friendly energy mix.

2.2.1. Overview of the Project Site and planned Infrastructure

The project site is located north-east of the Harmony Joel operations, approximately ~20km north-east of the town of Theunissen within the Masilonyana Local Municipality and within the Lejweleputswa District Municipality, Free State Province.

The PV facility is located on Portion 0 of the Farm Leeuwbult 580 which is owned by the Mine but outside of the mining area (the project would not impact on mining activities).

A technically feasible project site, with an extent of 1000ha has been identified by Freegold Harmony (Pty) Ltd as a technically suitable area for the development of the Project. A development area of ~220ha was demarcated within this project site and allows an adequate footprint for the installation of a solar PV facility with a contracted capacity of up to 18MW, while allowing for the avoidance of environmental site sensitivities. The size of the development footprint within the development area will be confirmed in the EIA Phase once the facility layout is available for assessment.

The development footprint will contain the following infrastructure to enable the Solar PV Facility to generate up to 18MW:

- » PV modules and mounting structures
- » Inverters and transformers a SCADA room, and maintenance room
- » Cabling between the project components, to be laid underground where practical
- » Access roads, internal roads and fencing around the development area.
- » Temporary and permanent laydown areas and O&M buildings.
- » Grid connection solution which will tie-in to Shafts 1 & 2 HJ Joel Mining Substation (located ~850m south west of the project site) via a 1.2km power line.

Table 2.1 provides the details of the Harmony Joel Solar PV facility, including the main infrastructure components and services that will be required during the project life cycle.

Table 2.1: Details of Harmony Joel Solar PV Facility and associated infrastructure. Specific details to be confirmed in the EIA phase.

Component	Description / Dimensions
Total extent of the Affected Properties, also referred to as the project site	~ 1000 ha
Total extent of the PV Development area	~ 220 ha
Contracted capacity of the facility	18MW
Technology	» Monofacial or Bifacial PV panels, mounted on either fixed-tilt, or single-axis tracking systems
PV panels	» Height: 5m from ground level (installed).
Facility Substation	» On-site facility substation located on Portion 0 of the Farm Leeuwbult 580 » Approximately 2 ha in extent.
Switching Substation	» Switching substation located within Portion 0 of the Farm Leeuwbult 580. » Approximately 2ha in extent
Grid Connection	» Grid connection solution which will tie-in to Shafts 1 & 2 HJ Joel Mining Substation (located ~850m south west of the project site) via a 1.2km power line
Site and internal access	» Wherever possible, existing access roads will be utilised to access the project site and development area. Internal roads of up to 6m in width will be required to access the PV panels and the on-site substation.

Other infrastructure	<ul style="list-style-type: none">» Laydown areas» Operations and Maintenance buildings» Control centre» Warehouse/ workshop
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Table 2.2 provides details regarding the requirements and the activities to be undertaken during the Harmony Joel Solar PV Facility development phases (i.e., construction phase, operation phase and decommissioning phase). **Section 2.3** provides illustrations of technology considered for the solar energy facility and the generation of electricity.

2.2.2. Activities during the Project Development Stages

A series of activities are proposed as part of the design, pre-construction, construction, operation, and decommissioning phases associated with the development of the Harmony Joel Solar PV Facility. These are discussed in more detail below.

Table 2.2: Details of the Harmony Joel Solar PV Facility project development phases (i.e., construction, operation, and decommissioning)

Construction Phase	
Requirements	<ul style="list-style-type: none"> » Project requires an Environmental Authorisation from the DESTEA and a generating authorization issued by NERSA. » Construction expected to be 6 to 12 months in duration. » The construction phase involves installation of the solar PV panels and the structural and electrical infrastructure to make the plant operational. In addition, preparation of the soil and improvement of the access roads would continue for most of the construction phase. » Create direct construction employment opportunities. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Theunissen and transported to and from site on a daily basis. » Overnight on-site worker presence would be limited to security staff. » Waste removal and sanitation will be undertaken by a suitably qualified sub-contractor. Waste containers, including containers for hazardous waste, will be located at easily accessible locations on site when construction activities are undertaken. » Electricity required for construction activities will be provided by the mine. Where low voltage connections are possible, these will be utilised. » Water required for the construction phase will be supplied by the mine or municipality. In addition, and where the mine cannot supply water it will be obtained via the Municipality. Should water availability at the time of construction be limited, water will be transported to site via water tanks. Water will be used for sanitation and potable water on site as well as construction works.
Activities to be undertaken	
Conduct surveys prior to construction	<ul style="list-style-type: none"> » Including, but not limited to: a geotechnical survey, site survey and confirmation of the panel micro-siting footprint, and survey of the on-site collector substation site to determine and confirm the locations of all associated infrastructure.
Establishment of access roads to the Site	<ul style="list-style-type: none"> » Internal access roads within the site will be established at the commencement of construction. » Existing access roads will be utilised, where possible, to minimise impact. It is unlikely that access roads will need to be upgraded as part of the proposed development. » Access roads to be established for construction and / or maintenance activities within the development footprint.

	<ul style="list-style-type: none"> » Internal service road alignment will be approximately 6m wide. Location is to be determined by the final micro-siting or positioning of the PV panels.
Undertake site preparation	<ul style="list-style-type: none"> » Including the clearance of vegetation at the footprint of PV panel supports, establishment of the laydown areas, the establishment of internal access roads and excavations for foundations. » Stripping of topsoil to be stockpiled, for use during rehabilitation. » Vegetation clearance to be undertaken in a systematic manner to reduce the risk of exposed ground being subjected erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural / heritage value (where required).
Establishment of laydown areas and batching plant on site	<ul style="list-style-type: none"> » A laydown area for the storage of PV panels components and civil engineering construction equipment. » 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. » A temporary concrete batching plant of 50m x 50m in extent to facilitate the concrete requirements for foundations, if required.
Construct foundation	<ul style="list-style-type: none"> » 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, micropyle or drilled post / piles).
Transport of components and equipment to and within the site	<ul style="list-style-type: none"> » The components for the solar PV 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 and Construct Substation, Invertors	<ul style="list-style-type: none"> » For array installation, typically vertical support posts are driven into the ground. Depending on the results of the geotechnical study a different foundation method, such as screw pile, helical pile, micro-pile or drilled post / pile could be used. The posts will hold the support structures (tables) on which PV arrays would be mounted. Brackets attach the PV modules to the tables. » Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared. » While cables are being laid and combiner boxes are being installed, the PV tables are erected.

	<ul style="list-style-type: none"> » Wire harnesses connect the PV modules to the electrical collection systems. Underground cables and circuits connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure and ultimately the project's on-site substation.
Connection of PV panels to the substation	<ul style="list-style-type: none"> » 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. » Onsite substation to be connected to the collector substation via underground cables.
Establishment of ancillary infrastructure	<ul style="list-style-type: none"> » Site offices and maintenance buildings, including 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.
Connect substation to the power grid	<ul style="list-style-type: none"> » Grid connection solution which will tie-in to Shafts 1 & 2 HJ Joel Mining Substation (located ~850m south west of the project site) via a 1.2km power line
Undertake site rehabilitation	<ul style="list-style-type: none"> » Commence with rehabilitation efforts once construction 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	<ul style="list-style-type: none"> » Duration will be 15 to 25 years. » Requirements for security and maintenance of the project. » Employment opportunities relating mainly to operation activities and maintenance. » Employment opportunities will be available during the operation of the solar facility.
<u>Activities to be undertaken</u>	
Operation and Maintenance	<ul style="list-style-type: none"> » Full time security, maintenance, and control room staff. » All PV panels will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » Solar PV to be subject to periodic maintenance and inspection. » It is anticipated that the PV panels will be washed twice a year during operation using clean water with no cleaning products, or non-hazardous biodegradable cleaning products. » Disposal of waste products (e.g., oil) 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	<ul style="list-style-type: none"> » Decommissioning of the Harmony Joel Solar PV Facility infrastructure at the end of its economic life. » Potential for repowering of the facility, depending on the condition of the facility at the time.

	<ul style="list-style-type: none"> » Expected lifespan of approximately 15 to 20 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time. » It is expected that the areas of the project site affected by the solar facility infrastructure (development footprint) will revert back to its original land-use (i.e., agriculture) once the Harmony Joel PV facility has reached the end of its economic life and all infrastructure has been decommissioned.
<p>Activities to be undertaken</p>	
<p>Site preparation</p>	<ul style="list-style-type: none"> » Confirming the integrity of site 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.
<p>Disassemble and remove PV panels</p>	<ul style="list-style-type: none"> » 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

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

Harmony Joel Solar PV Facility will have a contracted capacity of up to 18MW and will make use of PV technology. Solar energy facilities, which utilise PV technology, use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity (refer to **Figure 2.1**).

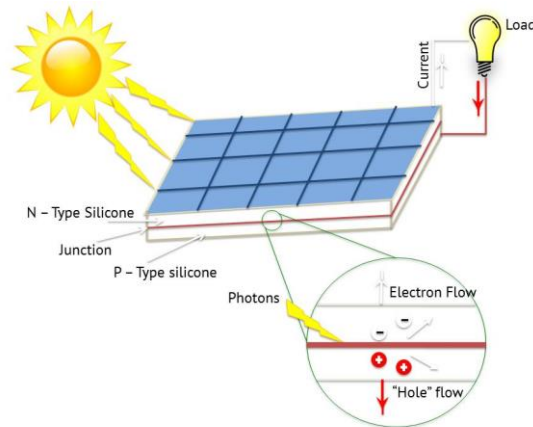


Figure 2.1: Diagram illustrating the Photovoltaic Effect (Source: Centre for Sustainable Energy)

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

Photovoltaic Cells

A PV cell is made of silicone that acts as a semi-conductor used to produce the Photovoltaic Effect. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV panel (refer to **Figure 2.2**). 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 (DC⁴)).

⁴ DC (direct current) is the unidirectional flow or movement of electric charge carriers (which are usually electrons). The intensity of the current can vary with time, but the general direction of movement stays the same at all times. As an adjective, the term DC is used in reference to voltage whose polarity never reverses. In a DC circuit, electrons emerge from the negative, or minus, pole and move towards the positive, or plus, pole. Nevertheless, physicists define DC as traveling from plus to minus. (Sourced from <https://whatis.techtarget.com/definition/DC-direct-current>).

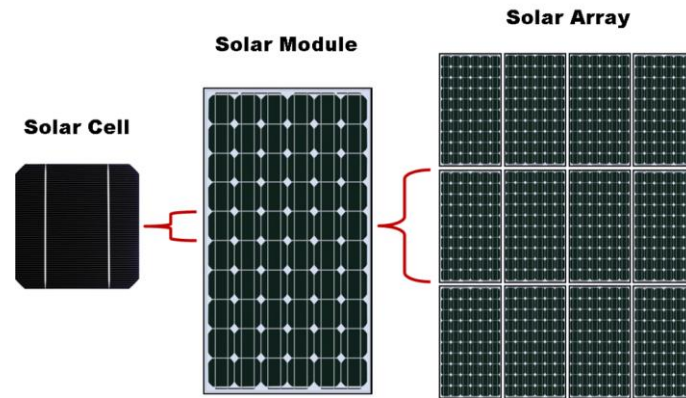


Figure 2.2: Overview of a PV cell, module and array / panel (Source: pveducation.com)

Bifacial Solar Panel Technology

Freegold Harmony (Pty) Ltd is considering the use of bifacial tracking technology. Bifacial (“two-faced”) modules produce solar power from both sides of the panel. Traditional solar panels capture sunlight on one light-absorbing side. The light energy that cannot be captured is simply reflected away. Bifacial solar panels have solar cells on both sides, which enables the panels to absorb light from the back and the front (refer to **Figure 2.3**). In general, more power can be generated from bifacial modules for the same area, without having to increase the development footprint.

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

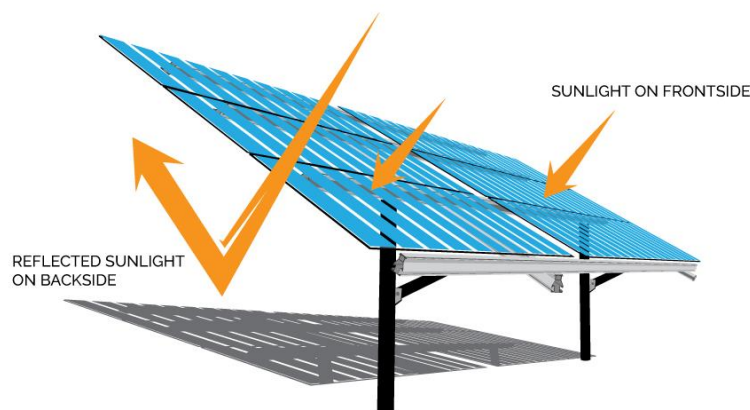


Figure 2.3: Diagram showing how bifacial Solar PV panels work (Source: <https://sinovoltaics.com/learning-center/solar-cells/bifacial-solar-modules/>)

Support Structures

PV panels will be fixed to a support structure. PV panels can either utilise fixed / static support structures, or single or double axis tracking support structures (refer to **Figure 2.4**). PV panels which utilise fixed / static support structures are set at an angle (fixed-tilt PV system) so as to optimise the amount of solar irradiation.

With fixed/static support structures the angle of the PV panel is dependent on the latitude of the proposed development and may be adjusted to optimise for summer and winter solar radiation characteristics. PV panels which utilise tracking support structures track the movement of the sun throughout the day so as to receive the maximum amount of solar irradiation.

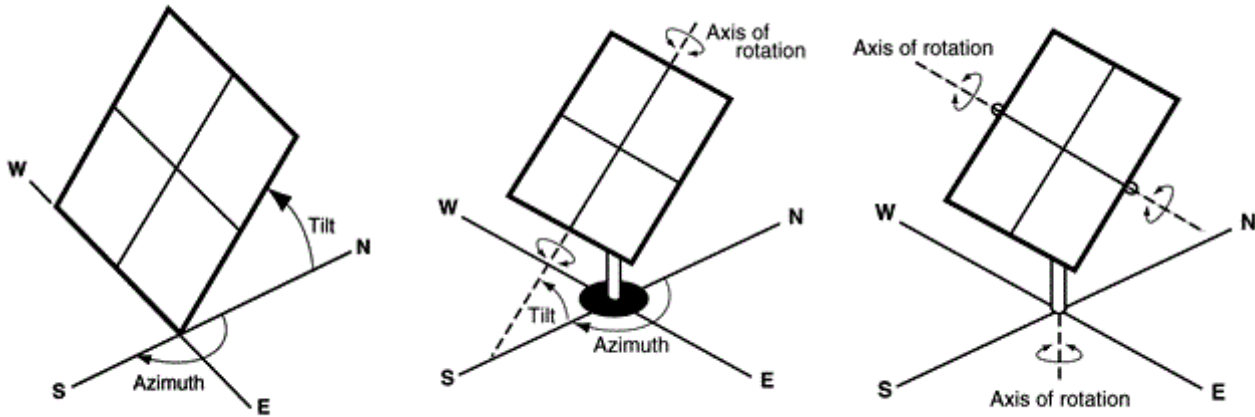


Figure 2.4: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

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

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for Harmony Joel Solar PV Facility as part of the Scoping Process.

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

This chapter of the Scoping Report includes the following information required in terms of the EIA Regulations, Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
3(g) a motivation for the preferred site, activity, and technology alternative	The identification and motivation for the preferred project site, the development area within the project site, the proposed activity and the proposed technology is included in sections 3.3.1, 3.3.3 and 3.3.4.
3(h)(i) details of the alternative considered	The details of all alternatives considered as part of the Harmony Joel Solar PV Facility are included in sections 3.3.1 – 3.3.5.
3(h)(ix) the outcome of the site selection matrix	The site selection process followed by the developer to identify the preferred project site and development area is described in section 3.3.1.
3(h)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such	Where no alternatives have been considered, motivation has been included. This is included in section 3.3.
3(g)(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity	Section 3.3.6. speaks to the conclusion regarding the alternatives and the way forward.

3.2. Alternatives Considered during the Scoping Process

In accordance with the requirements of Appendix 2 of the 2014 (as amended) Environmental Impact Assessment (EIA) Regulations (As amended) (GNR 326), reasonable and feasible alternatives including but not limited to site and technology alternatives, as well as the “do-nothing” alternative should be considered. Several other solar renewable energy facilities are planned within the broader study area, supporting the suitability of the area for solar PV projects.

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

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

In this instance, ‘the project’ refers to Harmony Joel Solar PV Facility, a solar energy facility with capacity of up to 18MW and associated infrastructure proposed to be developed and form part of Harmony Gold’s strategic shift to decarbonisation in the mining industry.

3.2.1. Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level and, as a result, project specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the DMRE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP)⁵, and will continue to be addressed as part of future revisions.

In this regard, the need for renewable energy power generation from solar PV facilities has been identified as part of the technology mix for power generation in the country for the next 20 years. Of relevance to the proposed project is the IRP 2019 which outlines South Africa's stepping stones to reduce coal's contribution to the energy mix to below 60%, in favour of renewables like wind, and PV technologies, which would account for 25% of the country's energy mix by 2030, furthermore the DMRE plans to repurpose existing coal-fired plants with renewable energy plants and / or battery storage solutions, and training people in new skills to ensure that jobs can be transferred. The IRP includes provision for distributed generation capacity for own-use. The threshold for distributed generation was raised to 100MW in August 2021. Project developers are exempted from applying for a license but are required to register with the National Energy Regulator of South Africa (NERSA) and comply with the relevant grid code(s).

The fundamental energy generation alternatives were assessed and considered within the development of the IRP and the need for the development of renewable energy projects has been defined. Therefore, fundamentally different alternatives to the proposed project are not considered within this EIA process.

3.2.2. Consideration of Incrementally Different Alternatives

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

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

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

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

⁵ The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning.

a) Property or Location Alternatives

The placement of a solar PV facility is dependent on several factors, namely, land suitability, climatic conditions (solar irradiation levels), topography, the location and extent of the development area, availability of grid connection infrastructure, and the need and desirability of the project.

The Harmony Joel Solar PV facility is located north-east of the Harmony Joel operations, approximately ~20km north-east of the town of Theunissen. The project site is considered highly favourable to establish a solar PV facility based on the evaluation of technical characteristics, including:

- » Solar resource characteristics (including Global Horizontal Irradiation (GHI)).
- » Land availability.
- » Land use and geographical and topographical considerations.
- » Access to the mine grid tie in point
- » Site accessibility.
- » Environmental and social aspects.

The Applicant considers the preferred development area within the study area as being highly favourable and suitable for the establishment of a solar PV facility. The PV facility will be located within close proximity of the Harmony Joel Mine processing plant.

The characteristics listed below were considered were identified by the developer as the main aspects that play a role in the opportunities and limitations for the development of a Solar PV facility. The characteristics considered, and the results thereof, are discussed in the sections below.

- » **Solar resource:** Solar resource is the first main driver of site selection and property viability when considering the development of Solar PV facilities. The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Global Horizontal Irradiation (GHI) for the study area is between ~1972 - 2118 kWh/m²/annum, which is considered favourable for the development of a solar PV facility.

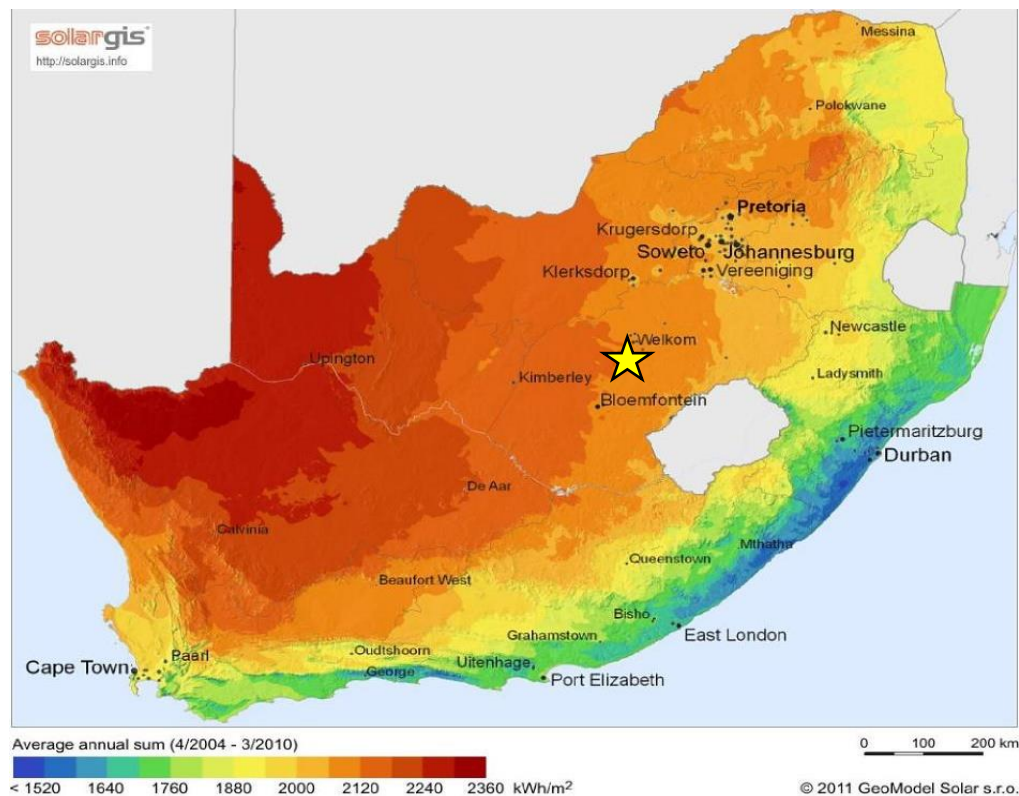


Figure 3.2: Solar irradiation map for South Africa. The approximate location of Harmony Joel Solar PV Facility site is indicated by the yellow star. (Source: adapted from GeoModel Solar, 2011).

- » **Topography:** The topography is characterised by slightly undulating plains with wetlands and / or drainage channels bisecting the area. The topography of the corridor can be described as generally favourable, when considering that most of the area consists of slopes of less than 1:5. The site is located at an altitude of between 900 and 940 meters above mean sea level (AMSL)
- » **Site extent and land availability:** The availability of land is a key feasibility criterion in the site selection process. The project site is of a suitable land size for the proposed 18MW facility. The development area, within which the project development footprint will be located, is 220ha. This area is considered to be sufficient for the planned 18MW PV facility and provides an opportunity for the avoidance of sensitive environmental features and areas. The project site is located on the Portion 0 of the Farm Leeuwbult 580, which is owned by the Mine but outside of the mining area (the project would not impact on mining activities).
- » **Land use:** Land use activities within the broader region are predominantly described as maize farming, with some mining activity evident towards the west (BEISA mine) of the proposed site. The mining activities intensify further north (beyond the study area boundary), towards Virginia and Welkom, where predominantly gold and uranium are mined. Farm settlements or residences occur at irregular intervals throughout the study area. Some of these, in close proximity to the proposed development site.
- » **Grid access:** A key factor in the siting of any solar PV facility is that the project must have a viable grid connection in order to evacuate the generated electricity. The grid connection point for the Harmony Joel Solar PV facility will be the Shafts 1 & 2 HJ Joel Mining Substation located to the south-west of the facility. A short grid connection solution will ensure that potential environmental impacts are kept to a minimum.

- » **Access to Road Infrastructure and Site access:** The road network surrounding the site comprises of the R73 to the north of the proposed site, the R730 located east of the development area and the R30 to the western side of the development site, there are various unnamed roads, one of which traverses the development area. The project site can be readily accessed via the main roads and unnamed Mine access roads. The site will be accessed via existing access points, therefore access spacing restrictions are not envisaged. At all Access points, it is recommended that vegetation within the road reserve be kept clear to maintain visibility.

Taking into consideration the solar resource, grid access, land suitability, landowner support, access to road infrastructure, the current land use of the project site and development area, the Harmony Joel Solar PV Facility project site 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 alternatives are proposed as part of this Scoping and EIA process.

3.2.3. Design and Layout Alternatives

The overall aim of the facility layout (i.e., development footprint) is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operation, and maintenance costs, and social and environmental impacts. The suitability of the site from an environmental perspective for the placement of the Harmony Joel Solar PV Facility in the area will be determined through the EIA process being undertaken for the facility. The findings of the specialist scoping assessments will assist the developer in selecting the optimum position for the PV arrays and associated infrastructures including, but not limited to, access roads, and laydown areas.

The affected properties (i.e. 1000ha in which development area (~220ha) and facility footprint is located, is sufficient in extent for the installation of a solar PV facility, while allowing for the avoidance of environmental site sensitivities. Findings from specialist field surveys were considered through this Scoping process in order to provide site specific information regarding the development area considered for the Harmony Joel Solar PV facility.

Areas to be avoided that will be identified during the scoping phase, specifically relating to ecological and sensitivities present within the project site will be utilised as a tool by the developer to identify and locate the development area of the PV facility with a contracted capacity of 18MW within the development area of 220ha. This will be undertaken with the aim of avoiding possible sensitive areas within the project site so as to limit impacts associated with the development which would result in unacceptable loss.

The site extent is sufficient for the proposed development and therefore reduces the need to consider alternative locations for the PV facility and the associated infrastructure. Potential environmentally sensitive areas have been identified as part of the Scoping Phase (refer to Chapter 7) for further detailed consideration (through site-specific specialist studies) during the EIA Phase. The environmental sensitivity identification process will inform the layout design for the PV facility, avoiding sensitive areas as far as possible, and thereby ensuring that the layout plan taken forward for consideration during the EIA Phase is the most optimal from an environmental perspective.

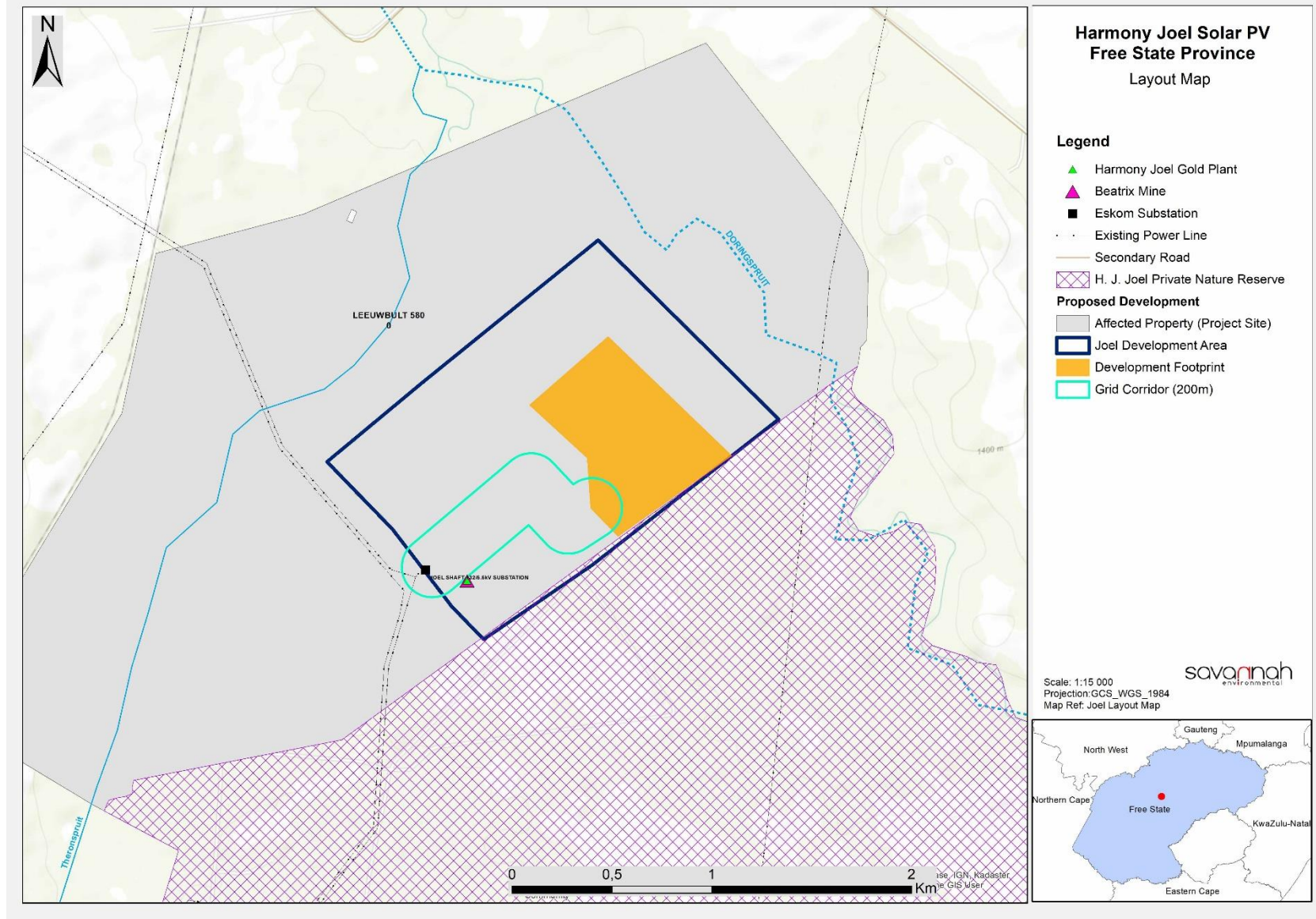


Figure 3.1: Figure indicating the Harmony Joel Solar PV Facility. The area demarcated in orange to the eastern side of the development area has been discarded as a suitable location alternative for further consideration.

3.2.4. Activity Alternatives

In an aim to decarbonize, mines are choosing to move away from coal generated power sources, such as those provided by Eskom. The alternatives to electricity supply from coal in South Africa are renewable energy and nuclear energy. Only renewables are considered as a feasible option for the proposed project due to economic and technical considerations.

Possible reasonable and feasible alternatives in terms of renewable energy for the mine include Solar, Biomass, Hydro Energy and Wind Energy. However, based on the preliminary investigations undertaken by the Project Applicant, no other renewable energy technologies are deemed to be appropriate for the site.

Therefore, the implementation of a solar energy facility at the proposed project site is considered as the most favourable and feasible alternative for further investigation. In terms of project and location compatibility, the proposed solar facility is considered to be the most feasible renewable energy land use alternative. Therefore, only the development of a solar PV facility is considered within this report.

3.2.5. Technology Alternatives

Freegold Harmony (Pty) Ltd is a renewable energy project developer and as such is only considering renewable energy technologies for the generation of up to 18MW of electricity. The project site is located near the town of Theunissen in the Free State Province. Based on the solar irradiation resource available, the topography of the site, and the current significant restrictions placed on other natural resources such as water, the development of a solar facility is the preferred option from a technology perspective.

Limited technology options are available for solar energy facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail in the area, so that optimality is obtained by the final site selection. PV technology is the preferred option for implementation on the site in comparison to CSP as it is associated with limited water demand requirements and a lower visual profile.

Based on available information, it is concluded by the developer that the project site is considered best suited for the development of a solar PV facility from a technical perspective. Therefore, no technology alternatives are considered within this Scoping Report.

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. Bifacial solar PV panels offer many advantages over monofacial PV panels, as power can be

produced on both sides of the module, increasing total energy generation. The preference will therefore be determined on the basis of technical considerations and the site conditions.

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

Once environmental constraining factors have been determined through the Scoping and EIA process, Freegold Harmony (Pty) Ltd, the preferred technology 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.

3.2.6. The 'Do-Nothing' Alternative

The 'do-nothing' alternative is the option of not constructing the Harmony Joel Solar PV facility at the identified site in the Free State. Should this alternative be selected, there would be no social or environmental impacts or benefits as a result of construction and operation activities associated with the solar PV facility for the Harmony Joel Mine. The 'do-nothing' alternative will therefore likely result in minimising the cumulative impact on the land, although the current land use activities on the project site (mining and agriculture) will continue. The socio-economic benefits associated with the implementation of the project would not be realised. This alternative will be assessed within the EIA Phase of the process.

3.2.7. Conclusion

As an alternative Freegold Harmony (Pty) Ltd was assessing an additional layout option within the proposed overall development area of 220ha (refer to **Figure 3.1**). However, based on the environmental sensitivities noted in the screening phase and the mine's commitment to ensuring best environmental practices are upheld held this alternative layout option within the assessed development area has been determined as not feasible by the project developer.

The Applicant considers the preferred development area within the study area as being highly favourable and suitable for the establishment of a solar PV facility. The PV facility will be located within close proximity of the Harmony Mine processing plant. The proposed site was previously used for mining related activities, with relevant infrastructure in place suitable for the PV facility, including fencing, ablutions facilities, and stormwater control facilities. By utilising an already disturbed area, this would mean minimising the potential for cumulative environmental impacts. Furthermore, with the site being near the existing Mine Substation, this ensures that the power line will be relatively short, saving on costs and further reducing cumulative environmental impacts associated with power line infrastructure.

The characteristics considered were identified by the developer as the main aspects that play a role in the opportunities and limitations for the development of a Solar PV facility.

CHAPTER 4: POLICY AND LEGISLATIVE CONTEXT AS WELL AS NEED AND DESIRABILITY FOR THE PROJECT

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

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

This chapter of the Scoping Report includes the following information required in terms of the EIA regulations, Appendix 2: Content of Scoping Report:

Requirement	Relevant Section
2(i) a description of the policy and legislative context within which the development is proposed including an identification of all 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.	Chapter 4 provides an overview of the policy and legislative context which is considered to be associated with the development of the solar energy facility. The regulatory and planning context has been considered at national, provincial, and local levels. A description of the policy and legislative context within which Harmony Joel Solar PV Facility is proposed is included in sections 4.3, 4.4, 4.5 and 4.6.
2(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location.	The need and desirability of the Harmony Joel Solar PV Facility is included and discussed from an international, national, regional, and site-specific perspective.

4.2 Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Mineral Resources and Energy (DMRE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as a solar energy facility is illustrated in **Figure 4.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of Harmony Joel Solar PV Facility. Even though the facility is proposed for the use by the mine, it is still important to demonstrate how this proposed project fits within this policy framework.

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

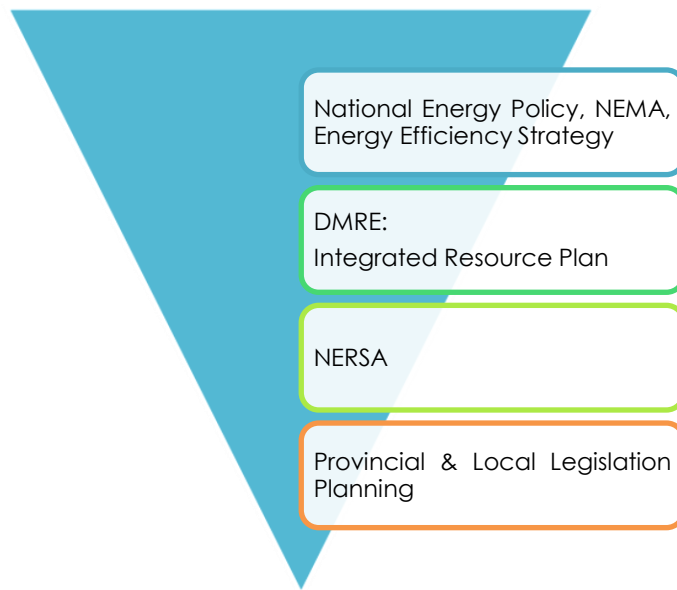


Figure 4.1: Hierarchy of electricity and planning documents

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

- » **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity. Furthermore, the Department is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. Therefore, in terms of the Act, approval from the Minister is required to ensure that proposed activities do not sterilise mineral resources that may occur within the project site and development area.
- » **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
- » **Department of Forestry, Fisheries, and the Environment (DFFE):** This Department is responsible for environmental policy and protected tree permits and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GN R326) as amended.
- » **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- » **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- » **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e., Water Use Licenses (WUL) and General Authorisation).
- » **The Department of Agriculture, Land Reform and Rural Development (DALRRD):** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).

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

- » **Provincial Government of the Free-State – Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA):** is the Competent Authority for the EIA process for the project and is responsible for issuing of biodiversity and conservation-related permits.
- » **Free State Department: Police, Roads and Transport:** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.
- » **Free State Heritage Resources Authority (FSPHRA):** This Department identifies, conserves and manages heritage resources throughout the Free State Province, as well as comments on heritage related issues within the 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 Free State Province, both the local and district municipalities play a role. The local municipality includes the Masilonyana Local Municipality, which forms part of the Lejweleputswa District Municipality. In terms of the Municipal Systems Act (No. 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

4.3 International Policy and Planning Context

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

Table 4.1: International policies and plans relevant to the Harmony Joel Solar PV Facility

Relevant policy	Relevance to the Harmony Joel Solar PV Facility
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	<p>The Conference of the Parties (COP), established by Article 7 of the UNFCCC, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention.</p> <p>The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries.</p> <p>South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016.</p> <p>The Paris Agreement set out that every 5 years countries must set out increasingly ambitious climate action. This meant that, by 2020, countries needed to submit or update their plans for reducing emissions, known as nationally determined contributions (NDCs). The COP26 summit held 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 concluded in</p>

Relevant policy	Relevance to the Harmony Joel Solar PV Facility
	<p>Glasgow with all countries agreeing the Glasgow Climate Pact to keep 1.5°C alive and finalise the outstanding elements of the Paris Agreement.</p> <p>South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business as Usual (BAU) emissions in 2020 and 2025, respectively.</p> <p>The policy provides support for the Harmony Joel Solar PV Facility which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.</p>
<p>The Equator Principles IV (October 2020)</p>	<p>The Equator Principles (EPs) IV constitute a financial industry benchmark used for determining, assessing, and managing project's environmental and social risks. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are applicable to large infrastructure projects (such as the Harmony Joel Solar PV Facility) and apply globally to all industry sectors.</p> <p>Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the Harmony Joel Solar PV Facility. In terms of the EPs, South Africa is a non-designated country, and as such the assessment process for projects located in South Africa evaluates compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability, and Environmental Health and Safety (EHS) Guidelines.</p> <p>The Harmony Joel Solar PV Facility is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended (GN R326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.</p>
<p>International Finance Corporation (IFC) Performance Standards and Environmental and Social Sustainability (January 2012)</p>	<p>The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012.</p> <p>Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an 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 Standards 2 through to 8 establish specific requirements to avoid, reduce, mitigate, or compensate for impacts on people and the environment, and to improve conditions where appropriate. While</p>

Relevant policy	Relevance to the Harmony Joel Solar PV Facility
	<p>all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS consistent with Performance Standard 1.</p> <p>Given the nature of the Harmony Joel Solar PV Facility, it is anticipated (at this stage of the process) that Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project.</p>
International Just Energy Transition Partnership (2021)	<p>The governments of South Africa, France, Germany, the United Kingdom, and the United States of America, along with the European Union, have announced a new ambitious, long-term Just Energy Transition Partnership to support South Africa's decarbonisation efforts. The Partnership aims to accelerate the decarbonisation of South Africa's economy, with a focus on the electricity system, to help it achieve the ambitious goals set out in its updated Nationally Determined Contribution emissions goals.</p>

4.4 Policy and Planning on a National Level

The South African government a commitment in August 2011 to support the development of renewable energy capacity.

A brief review of the most relevant national policies is provided below in **Table 4.2**. The development of Harmony Joel Solar PV Facility is considered to align with the aims of these policies, even where contributions to achieving the goals therein are only minor.

Table 4.2: Relevant national legislation and policies for Harmony Joel Solar PV Facility

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
Constitution of the Republic of South Africa, 1996	<p>Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</p> <p>The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts. 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.</p>
National Environmental Management Act (No. 107 of 1998) (NEMA)	<p>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.</p>

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<p>The national environmental management principles state that the social, economic, and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed, and evaluated, and decisions must be appropriate in the light of such consideration and assessment.</p> <p>The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.</p>
National Energy Act (No. 34 of 2008)	<p>The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking 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.</p> <p>The Act provides the legal framework which supports the development of power generation facilities.</p>
White Paper on the Energy Policy of the Republic of South Africa (1998)	<p>The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of RE and encouraging new entries into the generation market.</p> <p>The policy states that the advantages of RE include, minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include higher capital costs in some cases, lower energy densities, and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.</p>
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	<p>The White Paper on Renewable Energy Policy Supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of RE and aims to create the necessary conditions for the development and commercial implementation of RE technologies.</p> <p>The White Paper on RE sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing RE in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and accessible and affordable coal resources. However, massive RE resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped.</p> <p>The 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.</p>
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

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<p>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. Schedule 2 of the Electricity Regulation Act provides for exemptions from the obligation in the Act to apply for (and hold) a licence from National Energy Regulator (NERSA). In terms of this schedule, the threshold for distributed generation was raised to 100MW in August 2021. Project developers are exempted from applying for a license but are required to register with NERSA and comply with the relevant grid code(s).</p>
<p>National Development Plan 2030</p>	<p>The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030.</p> <p>In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:</p> <ul style="list-style-type: none"> » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. <p>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.</p> <p>The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of Harmony Joel Solar PV Facility 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.</p>
<p>Integrated Energy Plan (IEP), 2016</p>	<p>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:</p> <ul style="list-style-type: none"> » To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<ul style="list-style-type: none"> » 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. <p>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.</p> <p>The 8 key objectives of the integrated energy planning process are as follows:</p> <ul style="list-style-type: none"> » Objective 1: Ensure security of supply. » Objective 2: Minimise the cost of energy. » Objective 3: Promote the creation of jobs and localisation. » Objective 4: Minimise negative environmental impacts from the energy sector. » Objective 5: Promote the conservation of water. » Objective 6: Diversify supply sources and primary sources of energy. » Objective 7: Promote energy efficiency in the economy. » Objective 8: Increase access to modern energy.
<p>Integrated Resource Plan for Electricity (IRP) 2010-2030</p>	<p>The Integrated Resource Plan (IRP) for electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing, and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.</p> <p>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.</p> <p>Following the promulgation of the IRP 2010–2030, implementation followed in line with Ministerial Determinations issued under Section 34 of the Electricity Regulation (Act No. 4) of 2006. The Ministerial Determinations give effect to planned infrastructure by facilitating the procurement of the required electricity capacity.</p> <p>According to the IPP Procurement Programme overview report (2021), as at 31 March 2021, a total of 6 422MW has been procured under the REIPPP Programme from 112 IPPs in seven bid rounds, with 5 078MW being currently operational and made available to the grid. IPPs have commissioned 1005MW from two (2) Open Cycle Gas Turbines (OCGT) peaking plants.</p>

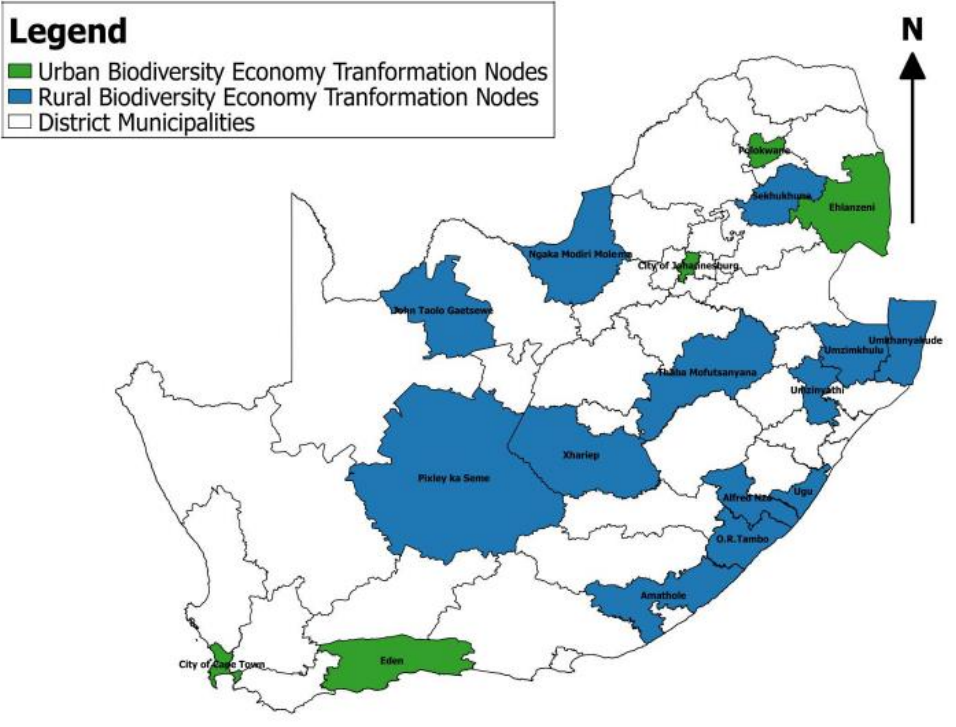
Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<p>Under the Eskom Build Programme, 1 332MW has been procured from the Ingula Pumped Storage Project, 1 588MW and 800MW from the Medupi and Kusile power stations and 100MW from the Sere Wind Farm.</p> <p>Provision has been made for the following new capacity by 2030:</p> <ul style="list-style-type: none"> » 1 500MW of coal » 2 500MW of hydro » 6 000MW of solar PV » 14 400MW of wind » 1 860MW of nuclear » 2 088MW of storage » 3 000MW of gas/diesel » 4 000MW from other distributed generation, co-generation, biomass and landfill technologies <p>Of relevance to the proposed project is the provision for distributed generation capacity for own use. Therefore, the development of the Harmony Joel Solar PV Facility is supported by the IRP 2019.</p>
<p>New Growth Path (NGP) Framework, 23 November 2010</p>	<p>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.</p> <p>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.</p>
<p>National Development Plan 2030 (2012)</p>	<p>The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030.</p> <p>In terms of the Energy Sectors role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:</p> <ul style="list-style-type: none"> » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. <p>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</p>

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<p>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.</p> <p>The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of Harmony Joel Solar PV Facility 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.</p>
<p>National Climate Change Response Policy, 2011</p>	<p>The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. This Agreement is open for signature and subject to ratification, acceptance or approval by States and regional economic integration organisations that are Parties to the Convention from 22 April 2016 to 21 April 2017. Thereafter, this Agreement shall be open for accession from the day following the date on which it is closed for signature. The agreement can only be sanctioned once it has been ratified by 55 countries, representing at least 55% of emissions.</p> <p>South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval, or accession with the Depositary.</p> <p>South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business as Usual (BAU) emissions in 2020 and 2025, respectively.</p> <p>The policy provides support for Harmony Joel Solar PV Facility, which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.</p>
<p>Climate Change Bill, 2018</p>	<p>On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans.</p> <p>Harmony Joel Solar PV Facility comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.</p>

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
<p>National Climate Change Response Strategy for South Africa, 2004</p>	<p>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.</p> <p>A number of principles and factors guided the conception of the strategy and are required to be implemented. These are:</p> <ul style="list-style-type: none"> » 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. » Recognizing that South Africa's emissions will continue to increase as development is realised. <p>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.</p>
<p>Infrastructure Development Act (2014) regarding Strategic Integrated Projects (SIPs)</p>	<p>The Presidential Infrastructure Coordinating Commission (PICC) is integrating and phasing investment plans across 18 Strategic Integrated Projects (SIPs) which have 5 core functions, including to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services, and support the integration of African economies.</p>

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<p>SIP 8 of the energy SIPs supports the development of RE projects as follows: <i>Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010) and supports bio-fuel production facilities.</i></p> <p>The development of Harmony Joel Solar PV Facility is aligned with SIP 8 as it constitutes a green energy initiative that would contribute clean energy in accordance with the IRP 2010 – 2030.</p>
<p>National Protected Area Expansion Strategy (2010)</p>	<p>The National Protected Area Expansion Strategy 2010 (NPAES) areas 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 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, 2010). According to the NPAES, there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. The study area is therefore outside the NPAES focus area.</p>
<p>National Biodiversity Economy Strategy (NBES) (March 2016)</p>	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<p>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.</p> <p>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 national coordination, leadership and guidance to the development and growth of the biodiversity economy.</p> <p>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.</p> <p>To address these transformation NBES imperatives, NBES has the principles of:</p> <ul style="list-style-type: none"> » 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. <p>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, 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.</p>

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	

4.5 Policy and planning at a Provincial Level

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

Table 4.3: Relevant provincial legislation and policies for Harmony Joel Solar PV Facility

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
<p>Free State Provincial Growth and Development Strategy (FSGDS) (2013 - 2030)</p>	<p>The overarching goal of the Free State Growth and Development Strategy (FSGDS) is to align the provincial and national policies and programmes and to guide development in terms of effective and efficient management and governance to achieve growth and development. The strategy is a living document that uses the latest business planning and evaluation tools in order to maximise the effect of all spending.</p> <p>Based on the social and economic development challenges of the Province, the Strategy identifies a few primary objectives, including stimulating economic development and developing and enhancing the infrastructure for economic growth and social development, poverty alleviation through human and social development, ensuring a safe and secure environment for all and the promotion of effective and efficient governance and administration.</p> <p>The development of the solar facility supports the overall objective of stimulating economic development and infrastructure investment towards growth and social development, by contributing to the energy mix, supply and infrastructure of the province. The development of the facility will also contribute (albeit limited) to the</p>

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<p>alleviation of poverty through the creation of direct and indirect employment opportunities and well as skills development.</p>
<p>Free State Provincial Growth and Development Strategy (FSGDS), Revised October 2013</p>	<p>The revised FSGDS refers to specific imperatives which sets the tone and pace for shared growth and development in the Province. These include:</p> <ul style="list-style-type: none"> » The need to effectively use scarce resources within the Province, while addressing the real causes of development challenges. » The need to accelerate service delivery based on a common provincial development agenda as the basis for provincial strategic direction. » The need to identify investment opportunities and provide an environment of certainty critical for private-sector investment. » The need to promote intergovernmental coordination between the three spheres of government. » The need to facilitate facilitates the implementation of the People's Contract within the Province. » The need to provide a common vision as the basis for common action amongst all stakeholders, both inside and outside government. » The need to provide a framework for budgets, implementation, performance management and spatial development. <p>The development of the solar PV Facility will assist with the need to effectively use scarce resources and the need to identify investment opportunities, including private sector-investment. The development of a solar facility reduces the need to make use of non-renewable resources for the generation of electricity and opens up the Province to further future solar energy development.</p>
<p>Free State Provincial Spatial Development Framework (PSDF) 2013 - Executive Summary (Inception Report)</p>	<p>The Free State PSDF is a provincial spatial and strategic planning policy that responds to and complies with, in particular, the National Development Plan Vision 2030 and the National Spatial Development Perspective (NSDP). The latter encourages all spheres of government to prepare spatial development plans and frameworks (such as the PSDF) that promote a developmental state in accordance with the principles of global sustainability as is advocated by, among others, the South African Constitution and the enabling legislation.</p> <p>The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed. The PSDF gives practical effect to sustainable development, which is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.</p> <p>The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local.</p> <p>The Harmony Joel Solar PV Facility will contribute to sustainable and economic development goals of the Free State PSDF, once completed and formally adopted.</p>
<p>Free State Green Economy Strategy (2014)</p>	<p>This Green Economy Strategy for Free State Province (FSGES) was developed in alignment with the national green economy strategy elaborated in the National Green Economy Framework and Green Economy Accord, as well the Free State</p>

Relevant legislation or policy	Relevance to Harmony Joel Solar PV Facility
	<p>Provincial Growth and Development Strategy. The development process was spearheaded by the Department of Economic Development, Tourism and Environmental Affairs (DETEA).</p> <p>The objective was to develop a green economy strategy to assist the Province to, amongst others, improve environmental quality and economic growth, and to develop green industries and energy efficiency within the Province.</p> <p>The Harmony Joel Solar PV Facility will contribute to the aim of energy efficiency and green industry while promoting economic growth and is therefore consistent with this strategy.</p>
Free State Investment Prospectus (2019)	<p>The Premier of the Free State considers providing access to individual investors to accurate and pertinent information makes it easier for investors to glean investor ready opportunities that are currently available in the Free State.</p> <p>Opportunity of the development of renewable energy is considered in the key sectors overview. The prospectus states that opportunities are opening up in the Province for the energy sector, including renewable energy. Rezoning for the development of multiple solar energy facilities has already been undertaken in the Province.</p> <p>Considering the future opportunities available for the development of renewable energy facilities (including solar PV facilities) the development of the Harmony Joel Solar PV Facility is considered to be in-line with the Investment Prospectus of the Province.</p>

4.6 Policy and planning at a Local Level

The local tiers of government relevant to the Harmony Joel Solar PV Facility project are the **Masilonyana Local Municipality**, which forms part of the **Lejweleputswa District Municipality**. Instruments and/or policies at both the district and local level contain objectives which align with the development of Harmony Joel Solar PV Facility. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 4.4: Relevant district and local legislation and policies for Harmony Joel Solar PV Facility

Relevant policy	Relevance to Harmony Joel Solar PV Facility
Integrated Development Plan (IDP) of the Lejweleputswa District (2021/2022)	<p>The IDP entails processes through which a municipality, its constituencies, various sector departments, interested and affected parties come together to prepare clear objectives and strategies which serve to guide allocation and management of resources within the municipal area of jurisdiction. The Integrated Development Plan spans a five-year period. The IDP is used by the municipality to fulfil its role of “developmental local governance”. Central to this role are the objectives and strategies contained in the plan, which guides the municipality in the realm of: Municipal Budgeting Institutional re-structuring in order to fulfil the strategic intent of the plan Integrating various sectors (housing, land use, agriculture) with economic, social dimensions. Performance Management Systems The Integrated Development Plan for Lejweleputswa District Municipality was commissioned and finally adopted in 2002 in terms of the Municipal Systems Act No. 32 of 2000.</p>

Relevant policy	Relevance to Harmony Joel Solar PV Facility
Integrated Development Plan (IDP) of the Masilonyana local Municipality (2020/2021)	<p>The Masilonyana Local Municipality is committed to effective and transparent governance by being an integrated, safe and harmonious environment with effective service delivery to attract investors. It seeks to:</p> <ul style="list-style-type: none"> » Promoting economic development » Providing sustainable services, and » Improving the quality of life of all people. <p>Transition to low carbon energy is what the municipality IDP strives to achieve and speed up and expand renewable energy, waste recycling, ensure buildings meet energy efficient standards. As part of its integrated environmental management & Climate change the following needs to be achieved:</p> <ul style="list-style-type: none"> » Increase the environmental literacy levels of stakeholders » Reduce the major sources of greenhouse gas emissions and digesting the large-scale supply of clean energy » Energy saving <p>The Harmony Joel Solar PV Facility indirectly contributes to the overall climate change response plan of the district municipality by providing energy without reliance on fossil fuels and therefore exacerbating climate change at a provincial and national level.</p>

4.7 Need and Desirability of the Proposed Development

Appendix 2 of the 2014 EIA Regulations (GNR 326), as amended requires that a Scoping Report include a motivation for the need and desirability of the proposed development, including the need and desirability of the activity in the context of the preferred location. The need and desirability of the development needs to consider whether it is the right time and the right place for locating the type of land-use/activity being proposed. The need and desirability of a proposed development is, therefore, associated with the wise use of land, and should be able to respond to questions such as, but not limited to, what the most sustainable use of the land may be.

The uptake of renewable energy sources in the mining sector has been a slow-moving transition – which can largely be attributed to the cost involved in establishing a solar/wind power plant, the added costs associated with storing that energy, regulatory challenges, and a limited track record in the industry.

Pressure from government and investors to improve environmental footprints by reducing carbon emissions is now one of the top five agenda items in business development, and incorporating renewable energy is an easy way to achieve this. In August 2021 with the aim to bolster energy security, President Cyril Ramaphosa announced that the licence threshold for independent power producers would be lifted from 1 MW to 100 MW, opening the door for companies to build their own generation facilities without the need to obtain a generation license from the National Energy Regulator of South Africa (NERSA).

Reliable and cost-effective energy, sourced and generated through private or internal arrangements eliminates the possibility of unexpected power outages and unreliable grid power from government-owned entities such as Eskom. The additional energy supply helps reduce the burden on such entities and reduces the need for energy management alternatives such as load shedding.

In terms of value creation through sustainability it is estimated that the Harmony Gold suite of solar PV projects (of which the Harmony Joel Solar PV Facility is one) will offset the liabilities of anticipated costs pending Scope 2 carbon taxes, against the backdrop of deregulation of the energy sector in South Africa, represents a big step forward for mining and private power industries in South Africa.

The construction of the solar energy plants will be a watershed moment for Harmony, as not only will these transactions help deliver on the Mine's environmental and social obligations and undertakings, but they will also de-risk the business and deliver many socio-economic benefits, including ensuring that investors and other stakeholders continue to derive value and positive returns in a global climate of energy uncertainty.

It is anticipated that this emission profile will decline over time, in line with Harmony Gold production profile, as well as when the renewable energy mix increases in the national electricity grid. However, a number of active decarbonisation measures are currently under way ahead of that amelioration.

Owing to the emissions profile, one of the strongest levers that the Company can pull is the deployment of renewable energy, with three upcoming solar photovoltaic (PV) projects (of which Harmony Joel Solar PV forms part) and wind energy projects to enable rapid decarbonisation of these particular operations.

Phase 3 targets are also being set for those emissions that occur through the third-party processing of the company's concentrate, where electricity will continue to remain the focus of this operation owing to its emissions predominance.

4.7.1 Need for the Harmony Joel Solar PV Facility

South Africa is a developing country with expanding energy demands and abundant coal supplies which is heavily relied upon to meet energy needs. The country acknowledges that carbon dioxide emissions from the usage of fossil fuels like coal and petroleum products have heightened worldwide concerns regarding climate change.

In South Africa, the problem of insufficient generation and supply is seen through the lens of global climate change, and the demand for increased investment in sustainable energy production is rapidly increasing. Renewable energy technologies may now compete with fossil-fuel technology because the government has created an enabling environment with an adequate legal and regulatory framework, and the technologies have become more economically feasible. As a result, the renewable energy industry will be able to function, grow, and contribute positively to the economy of South Africa and the global environment.

The National Development Plan 2030 formulated certain principles to guide "the transition to an environmentally sustainable low-carbon economy, moving from policy, to process, to action". The Harmony Joel Solar PV Facility aims to meet these principles to accomplish Harmony Gold's decarbonisation goals by capitalising on the new 100MW embedded generation threshold and supplement the electricity required for operation which are being purchased by the Joel Mine from Eskom, through the self-generation of electricity from the solar energy resource. This opportunity leverages the potential cost savings of such supplementary supply, while taking advantage of the reduced carbon footprint of the renewable nature of the technology.

In addition, the project would contribute towards meeting the national energy target as set by the Department of Energy (DoE) and assist the government in achieving its proposed renewable energy target of 17 800 MW by 2030. The proposed project would also have international significance as it contributes to South Africa being able to meet some of its international obligations by aligning domestic policy with internationally agreed strategies and standards as set by the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, and United Nations Convention on Biological Diversity (UNCBD) all of which South Africa is a signatory to. Renewable energy is critical to South Africa as this source of energy is recognised as a major contribution to climate protection, has a much lower environmental impact, as well as advancing economic and social development.

The need and desirability from the perspective of the local community as reflected in the IDP and SDF for the area has been considered in this Scoping process. In the South African context, developmental needs (community needs) are often determined through the above planning measures (IDP and SDF). Although the renewable energy sector is not explicitly identified as a sector or initiative in all current municipal policy and planning documents as outlined above, it could contribute positively to the needs of the local community, including development, social services, education, and employment opportunities in this area through sustainable provision of energy to the Joel Plant mine. The Harmony Joel Solar PV Facility will create employment and business opportunities during the construction and operation phases, as well as the opportunity for skills development for the local community. In addition, indirect benefits and spend in the local area will benefit the local community. In addition, a significant benefit is that at the end of the Mine's life, the infrastructure will be made available for community benefit, in line with the Mine's Social and Labour Plan. Also in generating their own electricity, Harmony Gold lift the burden on an already constrained grid.

The DFFE (then, the Department of Environmental Affairs) Guideline on Need and Desirability (GN R891, 2014) notes that while addressing the growth of the national economy through the implementation of various national policies and strategies, it is also essential that these policies take cognisance of strategic concerns such as climate change, food security, as well as the sustainability in supply of natural resources and the status of our ecosystem services. The DFFE guideline further notes that at a project level (as part of an EIA process), the need and desirability of the project should take into consideration the content of regional and local plans, frameworks, and strategies. In light of the above, this section aims to provide an overview of the need and desirability for the proposed Harmony Joel Solar PV Facility by highlighting how it is aligned with the strategic context of international, national, regional, and local development policy and planning, and broader societal needs as appropriate.

4.7.2 Receptiveness of the proposed development area for the establishment of the Harmony Joel Solar PV Facility

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

- » **Proximity to the Harmony Joel Mine:** The development area is located in close proximity to the Harmony Joel Mine, which will be the exclusive user of the generated power and is therefore preferred for development of the proposed PV Facility. Furthermore, there are existing available infrastructure that are considered as possibly forming part of the grid connection points in order to be able to evacuate

the generated power from the PV facility to the Harmony Joel mine. The grid will tie-in behind the meter of the Harmony customer substation.

- » **Land suitability and land use activities** – The properties included in the project site were identified considering the feasible solar resource and are deemed technically feasible by the project developer for such development to take place. The project site is currently owned by the Harmony Gold and has an extent of 1000ha, which was considered by the developer as sufficient for the development of a 18MW Solar PV facility. An exact development footprint within the development area for the placement of infrastructure will be identified and assessed as part of the EIA Phase considering environmental constraints and sensitivities defined through the Scoping Study.

The broader project site is currently used for activities associated with mining and agricultural activities (grazing). The areas identified for the PV facility although on mining land will not impact on the mining activities. The development of the solar PV facility on this property will ensure the continuation of an economically viable land use and will support the long-term operation of the mine. 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 facility, and the proposed development area fits this criterion.

- » **Proximity to Towns with a Need for Socio-Economic Upliftment:** The proposed project is located near the towns of Theunissen and Virginia in the Free State. As per the Integrated Development Planning, these districts still experience high levels of unemployment, poverty, and inequality mainly amongst the youth, women, and people with disabilities. With the development of The Harmony Joel Solar PV Facility, secondary social benefits can be expected in terms of additional spend in the nearby towns due to the increased demand for goods and services. Considering the above, it is clear that a need for employment opportunities and skills development is present within the area.

Taking into consideration the solar resource, proximity to the mine, land availability and suitability, geographical and topographical location, access to road infrastructure and proximity to towns with a need for socio-economic upliftment, the development of the Harmony Joel Solar PV Facility within the proposed project site is considered to be desirable.

4.7.3 Benefits of Renewable Energy and the Need and Desirability in the South African Context

In support of the Paris Agreement and the United Nations Sustainable Development Goals, Harmony Gold plans to Roll out the Phase 1, Phase 2 and Phase 3 of their renewable energy strategy over the next four years, targeting a 20% reduction in carbon dioxide (CO₂) emissions by 2026, as well as achieve carbon neutrality emissions by 2045 as part of the company's Environmental, Social and Governance (ESG) strategy.

High and volatile energy costs are a key concern to the mining industry where above-inflation cost escalations and production interruptions threaten the sustainability of their operations. It has been estimated that Harmony Gold South Africa spends approximately 18% of their annual operating costs on energy consumption. The uncertainty around energy cost escalations in South Africa, underpinned by severe Eskom financial constraints, is compounded by concerns about the reliability of energy supply. Adoption of renewable energy as a supply source partially mitigates these operational risks and in turn improves the sustainability of the Harmony Gold mining operations.

In Phase 1 of Harmony's decarbonisation strategy, the Company has established three plants with a total capacity of 18MW which will deliver more than 68 gigawatt hours ("GWh") of clean power to Harmony's Free State operations, mitigating 65 000 tonnes of carbon dioxide emissions in their first 12 months of operation.

In Phase 2, the Company will be building an additional 230MW of renewable energy at their various longer-life mines. Harmony Gold estimates that the project will deliver over R500 million per annum in electricity cost savings once it reaches full production. The plants rank amongst the biggest solar PV plants for private offtake in South Africa to date, and construction is planned to start by June 2023. The five on-site solar PV plants are to be developed at various Harmony Gold Free State mining operations as part of Harmony's strategy to address its Energy and Decarbonisation goals. The proposed solar PV plants will be connected into their respective substations at the corresponding operational loads. The PV facilities include:

- » 100MW Harmony Moab Khotsong Solar PV Facility, Vierfontein, Free State Province
- » 14MW Harmony Central Plant Solar PV Facility, Virginia, Free State Province
- » 18MW Harmony Joel Solar PV Facility, Theunissen, Free State Province
- » 30MW Harmony One Plant Solar PV Facility, Welkom, Free State Province
- » 30MW Harmony Target Solar PV, Allanridge, Free State Province

Phase 3 is still in the planning stage and progressing as anticipated to deliver additional clean power to Harmony's operations.

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

- » **National and Provincial and Local Planning Considerations** - Renewable energy is strongly supported at a national, provincial, and local level (refer to Chapter 4 for more details). The introduction and adoption of the New Growth Path in South Africa has seen increased emphasis towards developing and growing the green economy within the country, supported among others, by the Industrial Policy Action Plan (IPAP2) of 2010 and revised Integrated Resource Plan (IRP2), additionally the Cabinet approved a number of key supportive policies. The policies in question included the Medium-term Strategic Framework (MTSF) 2009–2014, the Ten-year Innovation Plan, the revised Industrial Policy Action Plan for 2010/11–2012/13 (IPAP2), and others mentioned previously. Nationally, the development and investment in renewable energy is further supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all refer to renewable energy, together with the White Paper on Renewable Energy which has been adopted by Parliament.
- » **National and Provincial Sustainable Energy Programs** - Various funding mechanisms and programmes related to renewable energy have also been considered. One of these, the Independent Power Producer Procurement Programme contributes substantially towards socio-economic and environmentally sustainable growth. It is also aimed at stimulating the renewable energy industry in South Africa. This programme has opened the market for renewable energy substantially in South Africa and holds sustainable potential for the Free State Province. The Green Energy Efficiency Fund supports the introduction of self-use renewable energy technologies. Also available are the South African Renewables Initiative and the Renewable Energy Market Transformation Project. There are also a number of mechanisms that support renewable energy production linked to domestic manufacturing

and the use of green technologies such as the Manufacturing Competitiveness Enhancement Programme.

- » **Free State Sustainable Energy Programs** – The Free State Province has aimed to transition to Green Economy by the year 2030. Each of the four District Municipalities and the Metro has come up with their vision and a mission statement. The Province has drafted long-term and short-term building blocks to the Green Economy transition. The Free State has significant potential for the harvesting of solar energy. Projects in the pipeline for this sector include the manufacturing of solar water geysers and the manufacturing of solar-modules and solar panels assembly facility. The Xhariep region has the second best solar-radiation index after Upington in the Northern Cape. It provides the opportunity to harness the natural sun power and to generate electricity.
- » **Socio-economic upliftment of local communities:** The Harmony Joel Solar PV Facility has the potential to create much needed employment for unskilled locals during the construction phase. Where possible, training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. Some of the challenges facing the Local and District municipalities, as detailed in the IDPs include high rates of unemployment and high levels of poverty. The Local and District municipalities are therefore in need of economic development, sustainable employment opportunities and growth in personal income levels. A study undertaken by the DMRE, National Treasury and the Development Bank of Southern Africa (DBSA) in June 2017 found that employment opportunities created during the construction phase of renewable energy projects implemented to date had created 40% more jobs for South African citizens than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned, confirming the potential benefits for local communities associated with the implementation of renewable energy projects.
- » **Resource saving:** It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability. Renewable energy also translates into revenue savings, as fuel for renewable energy facilities is free, while compared to the continual purchase of fuel for conventional power stations.
- » **Exploitation of significant renewable energy resource:** At present, valuable renewable resources, including biomass by-products, solar irradiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio in South Africa.
- » **Economics:** As a result of the 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.
- » **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.

- » **Climate friendly development:** The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of GHG emissions. South Africa is estimated to currently be responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. The development of the Harmony Joel Solar PV Facility and the associated electricity generated as a result of the facility, will result in considerable savings on tons of CO₂ emissions.
- » **Support for international agreements:** The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol and 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.

CHAPTER 5: APPROACH TO UNDERTAKING THE SCOPING PHASE

In terms of the EIA Regulations of December 2014 (as amended) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of Harmony Joel Solar PV Facility 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 18MW and Activity 1 of Listing Notice 2 (GNR 325) being triggered.

An EIA process refers to the process undertaken in accordance with the requirements of the relevant EIA Regulations (the 2014 EIA Regulations (GNR 326), as amended), which involves the identification and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project or activity. The EIA process comprises two main phases: i.e., Scoping and EIA Phase, and is illustrated in **Figure 5.1**. Public Participation forms an important component of the process and is undertaken throughout both phases.



Figure 5.1: The Phases of an Environmental Impact Assessment (EIA) Process

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

This chapter includes the following information required in terms of Appendix 2: Content of a Scoping report:

Requirement	Relevant Section
2(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 activities to be undertaken, including associated structures and infrastructure.	All listed activities triggered and applied for are included in Section 5.2 .
2(g)(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 Harmony Joel Solar PV Facility is included in

Requirement	Relevant Section
	Section 5.5.2 and copies of the supporting documents and inputs are included in Appendix C .
2(g)(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 .
2(g)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	The methodology used 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 5.5.3 .

5.2. Relevant legislative permitting requirements

The legislative permitting requirements applicable to Harmony Joel Solar PV Facility, 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 5.3**

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

The NEMA (No. 107 of 1998) is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed, and reported on to the Competent Authority (the decision-maker) charged by NEMA with granting of the relevant Environmental Authorisation (EA).

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 Harmony Joel Solar PV Facility 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 (full Scoping and EIA).

Table 5.1 details all the listed activities identified in terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324) which may be triggered by the proposed development of the Harmony Joel PV facility and associated infrastructure, and for which an application for EA has been made to the Department of Small Business Development, Tourism and Environmental Affairs (DESTEA).

Table 5.1: Listed activities identified in terms of the Listing Notices (GNR 327, 325 and 324).

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV or more. Electrical infrastructure is required to connect the PV facility to the existing Shafts 1 & 2 HJ Joel Mining substation and will consist of an on-site substation and power lines of more than 33kV and less than 275kV. The site falls outside an urban area.
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	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 meters of a watercourse, measured from the edge of a watercourse Wetlands have been identified within the project site. The construction of the PV facility and associated infrastructure will 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 area.
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	14	The development and related operation of facilities and infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. The development of the project will require the construction and operation of facilities and infrastructure for the storage and handling of a dangerous good (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the on-site substation where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	19 (ii)	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic meters from a (i)watercourse. Some parts of the development area may be located within watercourses and 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)08 December 2014 (as amended)	24(ii)	The development of a road— (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.

Notice Number	Activity Number	Description of listed activity
		Access roads will be developed during the construction phase of the project.
Listing Notice 2 (GNR 325) 08 December 2014 (as amended)	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts 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 18MW.
Listing Notice 2 (GNR 325) 08 December 2014 (as amended)	15	The clearance of an area of 20ha or more of indigenous vegetation ⁶ . The clearance of an area in excess of 20ha of indigenous vegetation will be required for the development of the PV facility and associated infrastructure.
Listing Notice 3 (GNR 985) 08 December 2014 (as amended)	4(b)(i)(gg)	The development of a road wider than 4 metres with a reserve of less than 13.5 metres. b. Free State i. Outside urban areas: (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas. The site is located in the Free State Province, outside an urban area, The development of Harmony Joel Solar PV Facility will require the construction of a main gravel access road and internal gravel roads. The site is located in the Free State Province outside of an urban area. The site is surrounded by CBA 1 areas, although not in a CBA and the Joel Nature reserve is located directly adjacent to the development.
Listing Notice 3 (GNR 985) 08 December 2014 (as amended)	10(b)(i)(gg)(hh)	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. b. Free State i. Outside urban areas: (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or (hh) Areas within a watercourse or wetlands; or within 100 metres from the edge of a watercourse or wetland. The development of the project will require the construction and operation of facilities and infrastructure for the storage and handling

⁶ "Indigenous vegetation" as defined by the 2014 EIA Regulations (GNR 326) refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

Notice Number	Activity Number	Description of listed activity
		<p>of a dangerous good (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the on-site substation where such storage will occur inside containers with a combined capacity exceeding 30 cubic meters.</p> <p>The site is located in the Free State Province, outside an urban area,</p> <p>The development of Harmony Joel Solar PV Facility will require the construction of a main gravel access road and internal gravel roads. The site is located in the Free State Province outside of an urban area.</p> <p>The site is surrounded by CBA 1 areas, although not in a CBA and the Joel Nature reserve is located directly adjacent to the development.</p>
<p>Listing Notice 3 (GNR 985) 08 December 2014 (as amended)</p>	<p>12 (b) (i)</p>	<p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>b. Free State i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>The site is located in the Free State Province, outside an urban area,</p> <p>The development of Harmony Joel Solar PV Facility will require the construction of a main gravel access road and internal gravel roads. The site is located in the Free State Province outside of an urban area.</p> <p>The site is surrounded by CBA 1 areas, although not in a CBA and the Joel Nature reserve is located directly adjacent to the development</p>
<p>Listing Notice 3 (GNR 985) 08 December 2014 (as amended)</p>	<p>14(ii)((a)(b)(i)(hh)</p>	<p>The development of – (ii) infrastructure or structures with a physical footprint of 10 square meters or more; where such development occurs –</p> <p>(a) within a watercourse; or (c) if no development setback exists, within 32 meters of a watercourse, measured from the edge of a watercourse.</p> <p>b. Free State i. Outside urban areas: (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere or reserve.</p> <p>The development of the Harmony Joel Solar PV Facility will require the establishment of infrastructure (including a power line, and internal access roads) with a physical footprint exceeding 10m² within 32m of a watercourse. The development footprint of the PV facility will be up to ~50 ha in extent.</p>

Notice Number	Activity Number	Description of listed activity
		<p>The site is located in the Free State Province, outside an urban area,</p> <p>The development of Harmony Joel Solar PV Facility will require the construction of a main gravel access road and internal gravel roads. The site is located in the Free State Province outside of an urban area.</p> <p>The site is surrounded by CBA 1 areas, although not in a CBA and the Joel Nature reserve is located directly adjacent to the development</p>

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

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

In terms of the NFEPA (2011) and the NBAs 2018 National Wetlands Map, three (3) wetlands or watercourse features are located within the extent of the project area. Areas classified as wetlands are extensive throughout the surrounding area and the project will therefore be assessed in terms of the DWS regulations to determine if the site falls within any regulated areas.

Table 5.2 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 5.2: List of Water Uses published under Section 21 of NWA, as amended.

Notice No.	Activity No.	Description of Water Use
NWA (No. 36 of 1998)	Section 21 (c)	<p>Impeding or diverting the flow of water in a watercourse</p> <p>The development area considered for the establishment of the Harmony Joel Solar PV Facility has some wetlands located within the extent of the project site, that might be affected by the activities pertaining to the establishment of the solar PV facility. This will be confirmed during the EIA phase.</p>
NWA (No. 36 of 1998)	Section 21 (i)	<p>Altering the bed, banks, course, or characteristics of a watercourse.</p> <p>The development area considered for the establishment of the Harmony Joel Solar PV Facility has some wetlands located within the extent of the project site, that might be affected by the activities pertaining to the establishment of the solar PV facility. This will be confirmed during the EIA phase.</p>

In the event that the flow of water in the watercourses 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 (GN R267), or a GA registered in accordance with the requirements of Revision of General Authorisation. The process of applying for a WUL or GA registration will only be completed once a positive EA has been received. This is in line with the requirements of the Department of Water and Sanitation (DWS).

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

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system 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 resource 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). Overview of the Scoping and EIA (S&EIA) Process being undertaken for Harmony Joel Solar PV Facility

5.3 Overview of the Scoping and EIA (S&EIA) Process being undertaken for Harmony Joel Solar PV Facility

In terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notices (Listing Notice 1 (GNR 327) and Listing Notice 2 (GNR 325) the development of Harmony Joel Solar PV Facility requires EA from DFFE subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA), as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326). The need for a full S&EIA process to be

conducted in support of the application for EA is based on listed activities triggered which are contained within Listing Notice 2 (GNR 325).

The S&EIA process is to be undertaken in two phases as follows (refer to **Figure 5.2**):

- » The **Scoping Phase** includes the identification and description of potential issues associated with the project through a desktop study and consultation with I&APs and key stakeholders through a Public Participation process. The entire development area and development envelope are considered within this process. Through this study, areas of sensitivity within the broader site are identified and delineated in order to identify any environmental fatal flaws, and environmentally sensitive, or no-go areas which need to be considered. In accordance with Regulation 21(1) of the 2014 EIA Regulations (GNR 326) this Scoping Report prepared for the project will be subject to a 30-day review and comment period during which any Interested and Affected Party (I&AP) or Authority are invited to review and provide comment on the findings. Following the completion of this review period, a Final Scoping Report which incorporates all comments received during the 30-day public review and comment period, will be prepared, and submitted to DESTEA for its consideration. Following its receipt of the Final Scoping Report DESTEA has 43 days within which to either accept the Scoping Report, and advise the applicant to proceed or continue with the tasks contemplated in the Plan of Study for EIA, or refuse the Application for EA in the event that the proposed activity is in conflict with a prohibition contained in legislation, or the Scoping Report does not substantially comply with Appendix 2 of the 2014 EIA Regulations (GNR 326).

- » The **EIA Phase** involves a detailed assessment of potentially significant positive and negative direct, indirect, and cumulative impacts identified during the Scoping Phase. This phase includes detailed specialist investigations and a Public Participation process, and results in the compilation of an EIA Report and Environmental Management Programme (EMPr). In accordance with Regulation 23(1)(a) of the 2014 EIA Regulations (GNR 326) the EIA Report and EMPr prepared for the project will also be subject to a 30-day public review and comment period during which members of the public, I&APs, and authorities will be invited to review and provide comment on the EIA Report and EMPr. Following the conclusion of this review period a Final EIA Report and EMPr which incorporates all comments received during the 30-day review and comments period, will be prepared, and submitted to DESTEA for its consideration. Following its receipt of the Final EIA Report and EMPr, DESTEA has 107 days within which to either grant or refuse the EA.

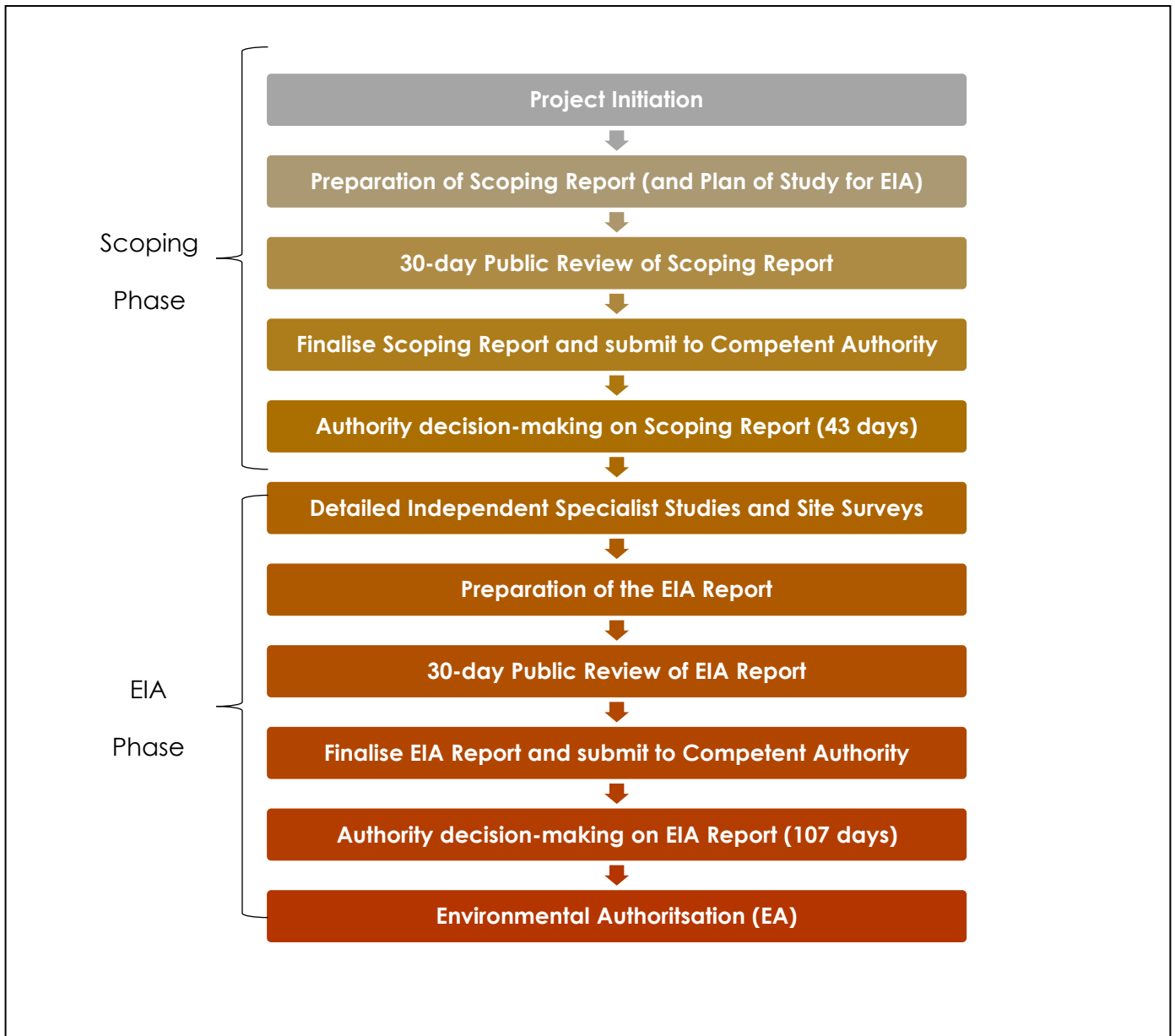


Figure 5.2: Regulated timeframe of an Environmental Impact Assessment (EIA) Process

5.4 Objectives of the Scoping Phase

This Scoping Report documents the evaluation of potential environmental impacts of Harmony Joel Solar PV Facility and forms part of the EIA process being conducted in support of an Application for EA for the project. The Scoping Phase has been conducted in accordance with the requirements of the 2014 EIA Regulations (GNR 326), and therefore aims 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 area through a review of existing baseline data, including specialist studies which were undertaken within the project area.
- » Identify potentially sensitive environmental features and areas within the broader project site and development area in order to inform the preliminary design process of the 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.

The following objectives of the Scoping Phase (in accordance with Appendix 2 of the 2014 EIA Regulations (GNR 326)) have been met, through the undertaking of a consultative process.

- » The identification of relevant policies and legislation regarding the activities to be undertaken have been identified and considered within this Scoping Report.
- » Activities to be undertaken for the development of Harmony Joel Solar PV Facility have been identified and motivated in terms of the need and desirability for the activities to take place.
- » Potential impacts associated with the undertaking of the identified activities and technology have been identified and described.
- » Identification of areas of high sensitivity to be avoided by the development area.
- » Key issues associated with the project to be addressed during the EIA Phase for further detailed study and ground-truthing have been identified and listed within this Scoping Report.
- » The level of assessment, expertise, 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), have been identified and included within this Scoping Report.

5.5 Overview of the Scoping Phase

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 (DESTEA) in terms of Regulations 5 and 16 of the 2014 EIA Regulations (GNR 326).
- » Undertaking a public participation process in accordance with Chapter 6 of GNR326, and the Department of Environmental Affairs (2017) Public Participation guidelines in order to identify issues associated with the proposed project.
- » Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR326), as amended, and the requirements of the Specialist Protocols published in Regulation GNR 320, issued 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 EIA in accordance with the requirements of Appendix 2 of the 2014 EIA Regulations (GNR 326).
- » 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 DESTEA for review and approval.

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

As the project is self-generation of electricity from a renewable resource intended for own-use and does not relate to the IRP, the Free State Economic, Small Business Development, Tourism and Environmental Affairs is the competent authority for the project. Consultation with these authorities is being undertaken throughout the Scoping Phase. To date, this consultation has included the following:

- » Submission of a pre-application meeting request to the DESTEA via email on **15 June 2022**. Following submission of the pre-application request the department determined that no pre-application meeting was considered necessary (refer to **Appendix C9**).
- » Submission of the Application for Environmental Authorisation to the DESTEA (as a hard copy)
- » Submission of the Scoping Report for review and comment by:
 - * The competent and commenting authorities.
 - * State departments that administer laws relating to a matter affecting the environment relevant to an Application for EA.
 - * Organs of State which have jurisdiction in respect of the activity to which the application relates.

The submissions, as listed above, are in hard copy, as required by the DESTEA. A record of all authority correspondence undertaken during the Scoping Phase is included in **Appendix B: Authority Correspondence**.

5.5.2 Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations 41 to 44 of the EIA Regulations 2014 (GN R326) (as amended). This Section of the Scoping Report details the public participation process conducted during the EIA process.

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

During the **Scoping Phase**:

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

During the **EIA Phase**:

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

During the **decision-making phase**:

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

The Public Participation process therefore aims to ensure that:

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

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

- » Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application.
- » Give written notice to:
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land.
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken.
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken.
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area.
 - (v) the municipality which has jurisdiction in the area.
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority.
- » Place an advertisement in one local newspaper.
- » Open and maintain a register of I&APs and Organs of State.
- » Release of a Scoping Report for a 30-day review and comment period.
- » Prepare a Comments and Responses (C&R) report which documents the comments received on the EIA process and during the 30-day review and comment period of the Scoping Report and the responses provided by the project team.

i. Stakeholder identification and Register of Interested and Affected Parties

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

I&APs have been identified through a process of networking and referral, obtaining information from previous EIA processes undertaken and Savannah Environmental's existing stakeholder databases, liaison with potentially affected parties in the broader study area and the project site, and a registration process involving completion of a registration and comment sheet. Stakeholders are required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via phone, text message (SMS and WhatsApp), email or fax, or registering their interest via the online stakeholder engagement platform. The key stakeholder groups identified include authorities, local and district municipalities, ward councillors, government bodies and state-owned companies, directly affected and adjacent landowners, community-based organisations and non-governmental organisations. An initial list of stakeholders identified and registered on the database is listed in **Table 5.3**.

Table 5.3: Initial list of Stakeholders identified for the inclusion in the project database during the public participation process for the Harmony Joel Solar PV Facility

Organs of State
National Government Departments
Department of Forestry, Fisheries and the Environment (DFFE)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture, Land Reform, and Rural Development (DALRRD)
Department of Human Settlements, Water and Sanitation
Department of Communications
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
Telkom SA SOC Ltd
Provincial Government Departments
Free State Department: Agriculture and Rural Development
Free State Department of Small Business Development, Tourism and Environmental Affairs (DESTEA)
Free State Department of Public Works & Infrastructure
Free State Heritage Resources Authority (FSHRA)
Local Government Departments
Lejweleputswa District Municipality

Masilonyana Local Municipality- including the Ward Councillor, ward committee members, community representative or local community forum members

Commenting Stakeholders

BirdLife South Africa

Endangered Wildlife Trust (EWT)

Affected landowners, tenants and occupiers

Neighbouring landowners, tenants and occupiers

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names⁷ of:

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

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

ii. Advertisements and Notifications

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

⁷ Contact details and addresses have not been included in the I&AP database as this information is protected by the Protection of Personal Information Act (No 4 of 2013).

- 40.(2)(d) Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and
- 40.(2)(e) Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to –
- (i) Illiteracy.
 - (ii) Disability; or
 - (iii) Any other disadvantage.

The EIA process was announced with an invitation to the Organs of State, potentially affected and neighbouring landowners, and general public to register as I&APs and to actively participate in the process⁸. This was achieved via the following:

- » Compilation of a background information document (BID) (refer to **Appendix C3**) providing technical and environmental details on the project and how to become involved in the EIA process. The BID and the process notification letter announcing the EIA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/I&APs of Harmony Joel Solar PV Facility, and providing background information of the project and inviting I&APs to register on the project's database were distributed via email on **22 August 2022**, and again on **14 November 2022**. The evidence of the distribution is contained in **Appendix C** of the Scoping Report. The BID is also available electronically on the Savannah Environmental website (<http://www.savannahsa.com/public-documents/energy-generation>).
- » Placement of site notices announcing the EIA process at visible points along the boundary of the development area (i.e., the boundaries of the affected property), in accordance with the requirements of the EIA Regulations on **18 August 2022**. Photographs and the GPS co-ordinates of the site notices are contained in **Appendix C2** of the Scoping Report.
- » Placement of an advertisement in the Volksblad Newspaper (in English) on **14 November 2022** to:
 - * Announce the project and the associated EIA process.
 - * Provide details of how I&APs can become involved in the EIA process, including details of the public participation consultant.
 - * Provide all relevant details to access the Savannah Environmental online stakeholder engagement platform.
 - * Provide details regarding the Scoping Report review period.
- » A copy of the newspaper advert, as sent to the newspaper and the newspaper advert tear sheet is included in **Appendix C2** of the Scoping Report.
- » The Scoping Report was made available for review by I&APs for a 30-day review and comment period from **14 November 2022** to **14 December 2022**. The full Scoping Report was made available on the Savannah Environmental website. The evidence of distribution of the Scoping Report is included in this Final Scoping Report submitted to the DESTEA.
- » Public participation meetings were held with key stakeholders via a virtual platform on:
 - * Tuesday, 14 September 2022 at 09:00 – 10:00 and
 - * Thursday, 20 October 2022 at 14:00 – 15:00.
- » Focus group meetings were held with key stakeholders via a virtual platform on:

⁸ This Scoping/EIA is a new Application for Environmental Authorisation. Public participation from a previous application is still relevant to this application, and details have also been included here and in the PIP Appendices.

* Tuesday, 6 September 2022 at 09:00 – 09:45 and

iii. Public Involvement and Consultation

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

Table 5.4: Summary of public involvement for Harmony Joel Solar PV Facility (refer to Appendix C)

Activity	Date
Distribution of the BID, process notification letters and stakeholder reply form announcing the EIA process and inviting I&APs to register on the project database. The BID and electronic reply form was also made available on the online stakeholder engagement platform.	22 August 2022
Placement of site notices at the project site, including placement of further notices in the town of Welkom	18 August 2022
Announcement of the EIA process in local newspaper: The Volksblad Newspaper	14 November 2022
Distribution of notification letters announcing the availability of the Scoping Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners) and key stakeholder groups.	14 November 2022
30-day review and comment period for the Scoping Report.	14 November 2022 to 14 December 2022
Virtual and in person meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: Adjacent landowners Authorities and key stakeholders (including Organs of State, local municipality, and official representatives of community-based organisations).	<ul style="list-style-type: none"> » Two public participation meetings were held with key stakeholders on Tuesday, 14 September 2022 and Thursday, 20 October 2022. » A focus group meeting was held with key stakeholders on Tuesday, 6 September 2022 at 09:00 – 09:45 via a virtual platform.
On-going consultation (i.e., telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA process

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

Focus group meetings have been held with key government departments, stakeholders and landowners during the scoping phase of the process. The purpose of these focus group meetings is to introduce the project and EIA process, to facilitate comments on the EIA process and Scoping Report, as well as to record any issues or concerns raised by stakeholders regarding the project. These meetings have been held via virtual platform. The minutes of these meetings have been included in the Scoping Report (refer to **Appendix C7**).

Consultation has also taken place via:

- » One-on-one consultation meetings
- » Telephonic consultation sessions
- » Written, faxed or e-mail correspondence.

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

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

I&APs registered on the database were notified by means of a notification letter of the release of the Scoping Report for a 30-day review and comment period, invited to provide comment on the Scoping Report, and informed of the manner in which, and timeframe within which such comment must be made. The report has been made available in soft copies to I&APs. Hard copies can be made available on request where sanitary conditions can be maintained.

The Scoping Report has also been made available on the Savannah Environmental website (<https://www.savannahsa.com/public-documents/energy-generation>). The notification was distributed prior to commencement of the 30-day review and comment period, on **14 November 2022**. Where I&APs were not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions were used to provide the I&APs with a platform to verbally raise their concerns and comments on the proposed development.

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period are recorded and included in **Appendix C6** and **Appendix C7** of the Scoping Report.

v. Identification and Recording of Comments

Comments raised by I&APs to date are captured into a Comments and Responses (C&R) Report included in **Appendix C8** of the Final Scoping Report. These include comments raised through the use of the Savannah Environmental online stakeholder engagement platform and any other written comments received. The C&R Report will include detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised during the public participation process.

Meeting notes of all the telephonic discussions and virtual meetings are included in **Appendix C7**.

5.6. Evaluation of Issues Identified through the Scoping Process and Outcomes of the DFFE Web-Based Screening Tool

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

The requirement for the submission of a Screening Report (included as **Appendix L** of the Scoping Report) for the Harmony Joel Solar PV Facility is applicable as it triggers Regulation 19 of the EIA Regulations, 2014, as amended. **Table 5.5** 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 development area under consideration.

Table 5.5: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of the Harmony Joel Solar PV Facility.

Issues (both direct and indirect environmental impacts) associated with the Harmony Joel Solar PV facility identified within the scoping process have been evaluated through specialist studies by specialist consultants. These specialists include:

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural Impact Assessment	Screening tool: High Sensitivity Required an agricultural impact assessment (in accordance with the protocol prescribed in GNR 320). Verified Sensitivity by Specialist: Medium to Medium-Low	A scoping report is included as Appendix E . Based on the outcome of the desktop analysis of available data as well as the data obtained during the site visit, it has been concluded that the entire development area have medium to low sensitivity to the development from the perspective of soil and agricultural potential conservation. The impacts to soils and agriculture will be further assessed during the EIA phase.
Landscape/Visual Impact Assessment	Screening tool: Very High Sensitivity (General Assessment Protocols) Verified Sensitivity by Specialist: Medium	A Visual scoping study is included as Appendix H in this Scoping Report. Some components of the PV Facility and associated infrastructure may be visible does not necessarily imply a high visual impact. Sensitive visual receptors within (but not restricted to) a 3km buffer zone from the facility need to be identified and the severity of the visual impact assessed within the EIA phase. A detailed assessment will be undertaken in the EIA Phase of the process.

<p>Archaeological and Cultural Heritage Impact Assessment</p>	<p>Screening tool: Low Sensitivity</p> <p>Required an archaeological & cultural impact assessments (No specific protocol- consider general requirements (GG 45421 of 10/05/2019)_DRAFT))</p> <p>Verified Sensitivity by Specialist: Low</p>	<p>A Heritage Screening (which covers both archaeological and cultural aspects of the project site) is included in this Scoping Report as Appendix G. Heritage impacts will be further assessed during the EIA phase.</p>
<p>Palaeontology Impact Assessment</p>	<p>Screening tool: Very High Sensitivity</p> <p>Verified Sensitivity by Specialist: Low (If no fossils are uncovered during construction)</p>	<p>A Heritage Screening (which covers palaeontological aspects of the project site) is included in this Scoping Report as Appendix G. Paleontological impacts will be further assessed during the EIA phase.</p>
<p>Terrestrial Biodiversity Impact Assessment</p>	<p>Screening tool: Very High Sensitivity</p> <p>Required a terrestrial biodiversity impact assessment and a plant species assessment (Terrestrial Biodiversity Assessment Protocols)</p> <p>Verified Sensitivity by Specialist: Medium to Low</p>	<p>An Ecological scoping study (including flora and fauna) has been undertaken for the PV facility and is included as Appendix D of the Scoping Report. Based on the outcomes of the desktop study and available data, it has been indicated that the development area falls within the areas identified as Low to Medium Sensitivity. A detailed assessment will be undertaken in the EIA Phase of the process.</p>
<p>Aquatic Biodiversity Impact Assessment</p>	<p>Screening tool: Low Sensitivity</p> <p>Required an Aquatic Biodiversity impact assessment (in accordance with the protocol prescribed in GNR 320, Aquatic Biodiversity Assessment Protocols).</p> <p>Verified Sensitivity by Specialist: Low</p>	<p>An Ecological scoping study (including freshwater) has been undertaken for the PV facility and is included as Appendix D of the Scoping Report. Wetlands or watercourse features are located within the project site, as is the 500m regulated area of wetland features. Where surface freshwater resource features will be impacted by the proposed development, further assessments relating to freshwater resource features will be undertaken in the EIA Phase of the process.</p>
<p>Avian Impact Assessment</p>	<p>Screening tool: Low Sensitivity</p> <p>Verified Sensitivity by Specialist: High-Medium to Low (depending on the impact considered)</p>	<p>An Avifaunal Scoping Assessment has been undertaken and is included in the Scoping Report as Appendix F. A detailed assessment will be undertaken in the EIA Phase of the process.</p>

Civil Assessment	Aviation	Screening tool: Medium Sensitivity The need for a civil aviation assessment (in accordance with the protocol prescribed in GNR 320) Verified Sensitivity: Low	A small landing strip is located approximately 5.5km from the proposed development. The proposed development will not have an unacceptable impact on the landing strip. Further assessment of the potential impacts is not required. In terms of Obstacle Notice 3/2020 (Replacement for 17/11/2017): Additional Requirements for Solar Project Applications, a Glint & Glare Assessment will only be required where the proposed site is located within a 3km radius around an aerodrome. A Civil Aviation Compliance Statement in accordance with the Screening Tool Protocols is included as Appendix N .
Defence Assessment		Screening tool: Low Sensitivity	A defence or military base is not located within close proximity to the PV facility.
RFI Assessment		Screening tool: Low Sensitivity Verified Sensitivity: Low	The project site under consideration for the development of the Harmony Joel Solar PV Facility is located within an area that as classified as having low sensitivity for telecommunication. Telkom will however be consulted to provide written comment on the proposed development.
Plant Assessment	Species	Screening tool: Low Sensitivity	An Ecological scoping study (including flora and fauna) has been undertaken for the PV facility and is included as Appendix D of the Scoping Report. A detailed assessment will be undertaken in the EIA Phase of the process.
Animal Assessment	Species	Screening tool: Medium Sensitivity Necessitating an animal species assessment (in accordance with Animal Species Assessment Protocols prescribed in GN 43855)	

Specialists	Field of Study	Appendix
Darius Van Rensburg of DPR Ecologists and Environmental Services	Ecology and Freshwater	Appendix D
Marinè Pienaar of Terra Africa Consulting	Soils and agricultural capability	Appendix E
Lukas Niemand of Pachnoda Consulting	Avifauna	Appendix F
Jenna Lavin of CTS Heritage	Heritage and Paleo	Appendix G
Brogan Geldenhuys of Eco-Thunder Consulting	Visual impact	Appendix H
Brogan Geldenhuys of Eco-Thunder Consulting	Social impact	Appendix I

5.6.1 Evaluation of Issues Identified through the Scoping Process

Direct, indirect, and cumulative environmental impacts associated with the project identified during the Scoping Phase have been evaluated through consideration of existing information available for the Harmony Joel Solar PV Facility development area.

In order to evaluate issues and assign an order of priority, the following methodology was used to identify the characteristics of each potential issue/impact:

- » The **nature**, which includes a description of what causes the impact, 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 or national.
- » Identify **sensitive receptors** that may be impacted on by the proposed development and the types of impacts that are most likely to occur.
- » The **significance** of potential impacts in terms of the requirements of the 2014 EIA Regulations (including (nature, significance, consequence, extent, duration and probability of the impacts, the degree to which these impacts:
 - (i) Can be reversed.
 - (ii) May cause irreplaceable loss of resources; and
 - (iii) Can be avoided, managed, or mitigated.

Identify the potential impacts that will be considered further in the EIA Phase through detailed investigations.

The evaluation of the proposed project resulted in a description of the nature, significance, consequence, extent, duration, and probability of the identified issues, as well as recommendations regarding further studies required within the EIA Phase.

5.6.2 Finalisation of the Scoping Report

The final stage of the Scoping Phase entails the recording and capturing of comments received from stakeholders and I&APs on the Scoping Report in order to finalise the Scoping Report for submission to DESTEA for decision-making. All written comments received will be addressed within the C&R Report (**Appendix C8**).

5.7 Assumptions and Limitations of the EIA Process

The following assumptions and limitations are applicable to the EIA process of Harmony Joel Solar PV Facility:

- » All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- » It is assumed that the development area for the solar PV facility identified by the developer represents a technically suitable site for the establishment of Harmony Joel Solar PV 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 PV facility and associated infrastructure (i.e., internal access roads).
- » The Scoping Phase evaluation of impacts has been largely based on desktop studies as well as the findings of studies which have been completed previously for this specific site. This information has been used to inform this Scoping report and will be verified by specialists in the EIA phase to assess the project development footprint for Harmony Joel Solar PV Facility.

5.8 Legislation and Guidelines that have informed the preparation of this Scoping Report

The following legislation and guidelines have informed the scope and content of this 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 is provided in **Table 5.5**.

Table 5.5: Relevant legislative permitting requirements applicable to Harmony Joel Solar PV Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	<p>In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that:</p> <p><i>“Everyone has the right –</i></p> <ul style="list-style-type: none"> » <i>To an environment that is not harmful to their health or well-being, and</i> » <i>To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:</i> <p style="padding-left: 40px;"><i>Prevent pollution and ecological degradation,</i></p> <p style="padding-left: 40px;"><i>Promote conservation, and</i></p> <p style="padding-left: 40px;"><i>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</i></p>	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the “right to an environment clause” includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	<p>The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326).</p> <p>In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>Considering the capacity of the proposed Harmony Joel Solar PV Facility project (i.e., contracted capacity of 18MW) and the triggering of Activity 1 of Listing Notice 2 (GNR 325) a full</p>	Free State DESTEA – Competent Authority	<p>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 DESTEA for review and decision-making.</p> <p>Considering the capacity of the Harmony Joel Solar PV facility project (i.e. contracted capacity of 18MW) and the triggering of Activity 1 of Listing Notice 2 (GNR 325) a full Scoping and EIA process is required in support of the Application for EA.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Scoping and EIA process is required in support of the Application for EA.		
National Environmental Management Act (No 107 of 1998) (NEMA)	<p>In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.</p> <p>In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	Free State DESTEA – Competent Authority	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)	<p>The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces.</p> <p>The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties.</p> <p>In terms of the Noise Control Regulations, no person shall make, produce, or cause a disturbing noise, or allow it to be made, produced, or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).</p>	Free State DESTEA – Competent Authority Masilonyana Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the location of the development area in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e., is an existing lawful use), is permissible under	Regional Department of Water and Sanitation	An Ecological scoping study (including freshwater) has been undertaken for the PV

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>a GA, or if a responsible authority waives the need for a licence.</p> <p>Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.</p> <p>Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)).</p> <p>Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks, or characteristics of a watercourse (Section 21(i)).</p>		<p>facility and is included as Appendix D of the Scoping Report.</p> <p>Freshwater features are identified for the project area. A water use authorisation for the project may be required from the DWS.</p>
<p>Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)</p>	<p>In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.</p> <p>Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.</p>	<p>Department of Mineral Resources and Energy (DMRE)</p>	<p>Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.</p> <p>In terms of Section 53 of the MPRDA approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM: AQA)</p>	<p>The National Dust Control Regulations (GNR 827) published under Section 32 of NEM: AQA prescribe the general measures for the control of dust in all areas and provide a standard for acceptable dust fall rates for residential and non-residential areas.</p> <p>In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dust fall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dust fall monitoring programme.</p> <p>Any person who has exceeded the dust fall standard set out in Regulation 03 must, within three months after submission of the dust fall monitoring report, develop, and submit a dust management plan to the air quality officer for approval.</p>	<p>Free State DESTEA</p> <p>Lejweleputswa District Municipality</p>	<p>In the event that the project results in the generation of excessive levels of dust the possibility could exist that a dust fall monitoring programme would be required for the project, in which case dust fall monitoring results from the dust fall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed.</p>
<p>National Heritage Resources Act (No. 25 of 1999) (NHRA)</p>	<p>Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance.</p> <p>Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites.</p> <p>Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.</p> <p>Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish</p>	<p>South African Heritage Resources Agency (SAHRA)</p> <p>Free State Provincial Heritage Resources Agency (FS PHRA)</p>	<p>A Heritage Impact Assessment will be undertaken for the project as per the requirements Section 38 of the NHRA. The Heritage Impact Assessment will be made available in the EIA Phase.</p> <p>Should a heritage resource be impacted upon, a permit may be required from SAHRA or the Free State Provincial Heritage Resources Agency (FS PHRA) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>it with details regarding the location, nature, and extent of the proposed development.</p> <p>Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.</p>		
<p>National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)</p>	<p>Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process.</p> <p>Three government notices have been published in terms of Section 56(1) of NEM:BA as follows:</p> <p>Commencement of TOPS Regulations, 2007 (GNR 150).</p> <p>Lists of critically endangered, vulnerable, and protected species (GNR 151).</p> <p>TOPS Regulations (GNR 152).</p> <p>It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).</p>	<p>DFFE</p> <p>Free State DESTEA</p>	<p>Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species.</p> <p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any listed protected species present on site which will require a permit.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)</p>	<p>Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out.</p> <p>Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).</p>	<p>DFFE Free State DESTEA</p>	<p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any alien and invasive species present on site.</p>
<p>Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)</p>	<p>Section 05 of CARA provides for the prohibition of the spreading of weeds.</p> <p>Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur.</p> <p>Regulation 15E of GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.</p>	<p>Department of Agriculture, Land Reform and Rural Development (DALRRD)</p>	<p>CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented.</p> <p>In terms of Regulation 15E (GN R1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods:</p> <ul style="list-style-type: none"> » Uprooting, felling, cutting, or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<ul style="list-style-type: none"> » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4. » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	<p>According to this Act, the Minister may declare a tree, group of trees, woodland, or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734.</p> <p>The prohibitions provide that “no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister”.</p>	DFFE	<p>A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals.</p> <p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any protected trees present on site which will require a permit.</p>
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	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of Harmony Joel Solar PV Facility, in terms of the preparation and maintenance of firebreaks, and the need to provide

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it.</p> <p>Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.</p>		<p>appropriate equipment and trained personnel for firefighting purposes.</p>
<p>Hazardous Substances Act (No. 15 of 1973) (HAS)</p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <p>Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat, or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance Group IV: any electronic product, and Group V: any radioactive material.</p>	<p>Department of Health (DoH)</p>	<p>It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored, or handled. If applicable, a license would be required to be obtained from the DoH.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Waste Act (No. 59 of 2008) (NEM: WA)</p>	<p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p> <p>The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of NEM: WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unfit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented. 	<p>DFFE – Hazardous Waste Free State DESTEA – General Waste</p>	<p>No waste listed activities are triggered by Harmony Joel Solar PV Facility; therefore, no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM: WA will need to be considered in this regard.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Road Traffic Act (No. 93 of 1996) (NRTA)</p>	<p>The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</p> <p>Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</p> <p>The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.</p>	<p>South African National Roads Agency (SANRAL) – national roads</p> <p>Free State Department of Community Safety and Transport Management (FS DCSTM):</p>	<p>An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally dimensioned loads 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 components may not meet specified dimensional limitations (height and width) which will require a permit.</p>
<p>Provincial Policies / Legislation</p>			
<p>Bophuthatswana Nature Conservation Act. No. 3 of 1973.</p>	<p>This Act provides for the sustainable utilisation of wild animals, aquatic biota, and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project:</p>	<p>Free State DESTEA</p>	<p>A collection/destruction permit must be obtained from Free State (DESTEA) for the removal of any protected plant or animal species found on site.</p> <p>Should these species be confirmed within the development footprint during any phase of the project, permits will be required.</p> <p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property.</p> <p>Aquatic habitats may not be destroyed or damaged.</p> <p>The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species.</p> <p>The Act provides lists of protected species for the province.</p>		<p>the presence of any listed species present on site which will require a permit.</p>

5.8.1 Best Practice Guidelines Birds & Solar Energy (2017)

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

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

- » 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.
- » 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.
- » 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.
- » 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 development located in a sensitive habitat, or which otherwise may have significant impacts on avifauna). **Table 5.7** 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 5.3: Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.

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

Regime 1: One site visit (peak season); minimum 1 – 5 days.

Regime 2: Pre- and post-construction; minimum 2 – 3 x 3 – 5 days over 6 months (including peak season); carcass searches.

Regime 3: Pre- and post-construction; minimum 4 – 5 x 4 – 8 days over 12 months, carcass searches.

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

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

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

- Avifaunal habitat (e.g., a wetlands, nesting, or roost sites) of regional or national significance.
- A population of a priority species that is of regional or national significance.
- A bird movement corridor that is of regional or national significance.
- 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
- Avifaunal habitat (e.g., a wetland, nesting, or roost sites) of local significance.
- A locally significant population of a priority species.
- A locally significant bird movement corridor.

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

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

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. For this reason, a summer and winter season bird monitoring survey will be conducted in line with Regime 2 for the Harmony Solar PV Facility. The Winter survey has already been conducted in July 2022; the findings have been used to inform the avifauna scoping report completed for the Scoping phase. The result from the Winter season bird monitoring will be used to inform both the development footprint as well as Avifauna Impact Assessment report, to be completed for the EIA Report.

5.8.2 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

5.8.3 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 6: DESCRIPTION OF THE RECEIVING ENVIRONMENT

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

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

This chapter includes the following information required in terms of the EIA Regulations, 2014 - Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
2(g)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	<p>The environmental attributes associated with the development of Harmony Joel Solar PV facility is included as a whole within this chapter. The environmental attributes that are assessed within this chapter includes the following:</p> <ul style="list-style-type: none"> » The regional setting of the broader study area indicates the geographical aspects associated with Harmony Joel Solar PV facility. This is included in Section 6.2. » The climatic conditions for the Welkom area have been included in Section 6.3. » The biophysical characteristics of the project site and the surrounding areas are included in Section 6.4. 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, cultural landscape and palaeontology) has been included in Section 6.5. » The social and socio-economic characteristics associated with the broader study area and the project site has been included in Section 6.6 » The visual quality, land-use and settlement patterns of the affected environment has been included in Section 6.7

A more detailed description of each aspect of the affected environment is included within the specialist Scoping Reports contained within **Appendices D - I**.

6.2. Regional Setting

The study area lies completely within the Middle Vaal Water Management Area (WMA) and entirely within the Highveld ecoregion (Kleynhans et al., 2005). The topography is characterised by slightly undulating plains with wetlands and / or drainage channels bisecting the area. Most properties situated within a 5km radius of the site is being used for livestock and crop cultivation.

The main characteristics of the study area includes mining, crop and livestock farming. Tourist attractions mostly occur on the outer edges of the study area, 20km radius, with the closest being the Allemanskraal Dam, approximately 16km South-East. The residential component of the study area includes farmsteads with associated workers housing as well as the towns of Virginia and Ventersburg and the townships of Meloding and Mmamahabane.

According to Mucina and Rutherford (2006) the site is situated in a summer-rainfall seasonal precipitation region, with Mean Annual Precipitation (MAP) of 560mm. Much of the rainfall is of convectional origin and peaks in December to January. The overall Mean Annual Temperature (MAT) is around 15°C. Incidences of frost are relatively high (43 days on average).

The Lejweleputswa District Municipality is located in the North western part of the Free State and is one of five district municipalities in the Free State Province. The district covers an area of 31 686km² and is made up of five local municipalities, of which the Masilonyana Local Municipality (which covers the study area) is one. According to the Free State Provincial Growth and Development Strategy (FSPGDS) (2004-2014), Lejweleputswa District Municipality is the major contributor in the Free State Gross Geographic Product (GGP) and is also an important agricultural area. The district is predominantly known as the Free State Goldfield which forms a part of the larger Witwatersrand basin. The economy of the region is dominated by the gold mining industry and agriculture sectors in particular maize production.

The Masilonyana Local Municipality covers an area of 6 796km² and is located in the western part of the Free State Province within Lejweleputswa District Municipality. The Masilonyana Local Municipality consists of 5 Local Councils, Brandfort, Soutpan, Theunissen, Verkeerdevlei and Winburg. Theunissen is the administrative seat of the Masilonyana Local Municipality and is located approximately 102km north east of Bloemfontein. The majority of the commercial and industrial activities in the Masilonyana Local Municipality are based in Theunissen and Winburg.

The main source of income in the municipality is due to the agricultural and mining sector. The total population of Masilonyana Local Municipality which includes both male and female for all towns, that is, Theunissen/ Masilo, Brandfort/ Majwemasweu, Winburg/ Makeleketla, Soutpan/ Ikgomotseng, Verkeerdevlei/ Tshepong, Rural, Star Diamond Mine, Beatrix Mine and Joel Mine is estimated at 80 090. This population includes Blacks, Coloureds, Indians and Whites. The following 15 population groups constitute the following percentages out of the total population group of the entire municipality, that is, Blacks (91,2%), Coloureds (1,28%), Indians (0,03%), and Whites (7,49%) respectively. The population has grown slightly due to the reduction of infant mortality, less people dying of HIV/ AIDS and economic migration caused by opening of new shafts at the Beatrix Mine and more people having to stay in Brandfort.

Due to the fact that mines cannot absorb all unemployment people, of which the youth are in majority in terms of unemployment and population stats; more emphasis must be put on training of unemployed (including youth, women and the disabled people) for self-reliance and to avoid high and unrealistic dependence on grants and funding (IDP 2012- 2017).

The proposed development is located on a terrain unit of rolling or irregular plains with low hills at an altitude of between 1,370 and 1,410 meters. During the pre-mining period the land on which the mine is now situated was used for agricultural purpose and mainly for cultivation of crops and grazing purposes.

The built environment surrounding the proposed development area ranges from high density low-income housing and informal rural type settlements to large mining and agriculture developments. Developments located adjacent to the proposed settlement are informal settlement, with limited infrastructure that only meets RDP Standards. Social facilities within the area are lacking, with the nearest school being located some few kilometres from the site. No infrastructure is currently in place on site; however, electricity, sewer and water will be connected onto existing bulk infrastructure currently servicing the surrounding areas. One access route to the site is proposed, via existing roads. Access to the majority of the area will take place from Main road (where a 60 – 80 m length of 6 m wide tarred road surface is proposed).

Land use activities within the broader region are predominantly described as maize farming, with some mining activity evident towards the west (BEISA mine) of the proposed site. The mining activities intensify further north (beyond the study area boundary), towards Virginia and Welkom, where predominantly gold and uranium are mined. Farm settlements or residences occur at irregular intervals throughout the study area. Some of these, in close proximity to the proposed development site.

The population density of the region is indicated as approximately 200 people per km², predominantly concentrated within the town of Virginia. An existing Eskom power line runs diagonally across the selected site, enabling a short distance for grid connection with minimal possible impact on avifauna or ecology.

Province	Free State Province
District Municipality	Lejweleputswa District Municipality
Local Municipality	Masilonyana Local Municipality
Ward number(s)	Ward 6
Nearest town(s)	Theunissen (20km SW)
Current Zoning	Mining
Current land use	The properties both currently lie fallow, having been used historically for agriculture
Access	The site can be readily accessed via an existing gravel access road.

The Free State

The Free State Province lies in the center of South Africa, located between the Vaal River in the north and the Orange River in the south. The region is one of flat, rolling grassland and fields of crops, rising to mountains in the north-east.

The province is the granary of South Africa, with agriculture central to its economy, while mining in the goldfield reefs is its largest employer.

Economic towns include Bloemfontein, Welkom, Kroonstad, Parys, QwaQwa, and Bethlehem. The Free State is the third- largest Province in South Africa, but it has the second-smallest population and the second-lowest population density. The culture is centered on traditional cultures but built on the influences of the early European settlers.

Close to 2.8-million people live in the Free State, with two-thirds speaking Sesotho, followed by Afrikaans, Zulu, Tswana, Xhosa and English.

The Free State is strategically placed to take advantage of the national transport infrastructure. Two corridors are of particular importance: the Harrismith node on the N3 corridor between Gauteng and KwaZulu-Natal, and the N8. The N1 connects Gauteng to the Western Cape. Bram Fischer International Airport in Bloemfontein handles about 250 000 passengers and 221 000 tons of cargo a year. Manufacturing also features in the provincial economic profile. This sector makes up 14% of the provincial output, with petrochemicals (via Sasol) accounting for more than 85% of the output.

The Free State Province comprises of four (4) Districts, namely Fezile Dabi, Lejweleputswa, Thabo Mofutsanyana and Xhariep (refer to **Figure 6.1**)

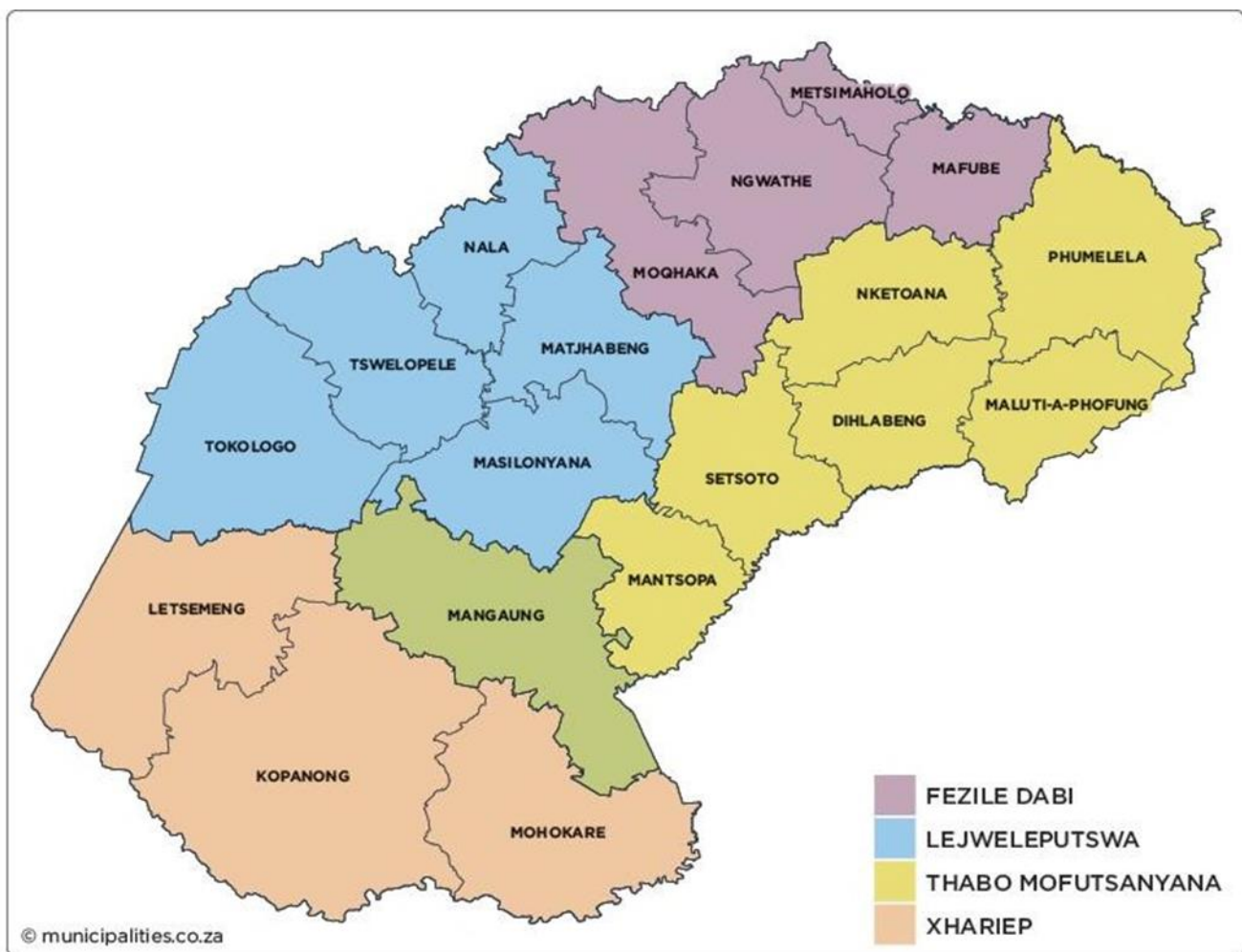


Figure 6.1: District municipalities of the Free State Province (Source: Municipalities of South Africa).

Lejweleputswa District Municipality

Lejweleputswa District Municipality is situated in the mid-western part of the Free State province, with an estimated area of about 31 930 km² (*Local government hand book, 2013*). The district borders the North-West province to the north, Fezile Dabi District Municipality to the north-east, and Thabo Mofutsanyane District Municipality to the east. It also borders Mangaung Metro and Xhariep District to the south and the

Northern Cape Province to the west. It consists of 22.9% of the Free State province's population, down from 26.7 % in 1996 (IHS Global Insight, 2015). The district is made up of five local municipalities, namely; Matjhabeng, Tokologo, Tswelopele, Nala and Masilonyana with about 17 towns.

The economy of the district relies heavily on the gold mining sector as the largest sector, dominant in two of the municipalities, Matjhabeng and Masilonyana, whilst the other Municipalities are dominated by agriculture. There is less diversification of the district's economy relying heavily on the mining sector and community service sector as the largest employers in the District. Matjhabeng is the largest municipality in the district and contributes the largest share of GVA-R in the District. The average annual GDP-R growth rate stands at -1.5 percent in 2014 for the district and is forecasted to decline even further to -2.9 percent in 2016 according to IHS Global Insight, as a result of low international commodity prices and a persistent drought in the agricultural sector. Output in agriculture is forecast downwards and prices in agricultural goods are expected to rise due to low output levels as given by the South African Reserve Bank in their monetary policy statement in September 2015 for the country in general.



Figure 6.2: Map showing the District and local municipalities (Source: Municipalities of South Africa)

Masilonyana Local Municipality is named after the mountain in the area. It is one of five municipalities in the district extending over 6 618km². It is situated between the province's biggest municipality, Mangaung Metro, in the south and the second-biggest municipality, Matjhabeng, in the north. The municipality is as a result of the merging of former Transitional Local Councils which included Theunissen, Brandfort, Winburg, Soutpan and Verkeerdevlei.

It is an impoverished semi-urban area with a high unemployment rate. The municipality plays host to two toll plazas on two major roads in the province; the Verkeerdevlei Plaza on the N1 is the last before entering

Bloemfontein from the north, and the Brandfort Plaza on the former R30 (now ZR Mahabane Road) is situated between Brandfort and Bloemfontein.

The Masilonyana Municipal area consists of the following towns:

- » Brandfort
- » Soutpan
- » Theunissen
- » Verkeerdevlei
- » Winburg

Brandfort is also known for its rich political history, which includes the National Military Museum on a farm that used to be a concentration camp during the Anglo-Boer War and the Winnie Mandela House, where Mandela was sentenced to House Arrest during the State of Emergency in the 1980s. Theunissen is also situated on the ZR Mahabane Corridor between Bloemfontein and Welkom, and hosts the three mines within the municipal jurisdiction. Winburg has economic potential because of its location, which is 100km west of Bloemfontein, and its linking of Bloemfontein with Johannesburg, Cape Town and Durban. It prides itself with the Voortrekker Monument as its Heritage Site, and Masilonyana boasts several game reserves across all its towns. The municipality prides itself on its tourist destinations, such as the Florisbad National Quaternary Research Station. This is where the first human skull was discovered. There are also cooperatives in Soutpan working on the salt lakes to produce salt. The key economic sectors are agriculture, mining, and community services. The Municipality also experienced the highest tourism spending that increased from 3.9% in 2008 to 5.1% in 2017.

6.3. Climatic Conditions

The climate within which the proposed facility is to be located has been derived from climatic data summarised for Merriespruit and Virginia (worldweatheronline.com and climate-data.org). The area receives about 400 mm of rain on average per year. From May to September, rainfall is minimal, with most rainfall occurring from November to March, peaking between January and March. Temperatures in summer peak during December and January at a daily average of 29°C. Winter temperatures peak with an average of 17°C for June. During July, night temperatures are on average 0°C, with frosts during winter being common.

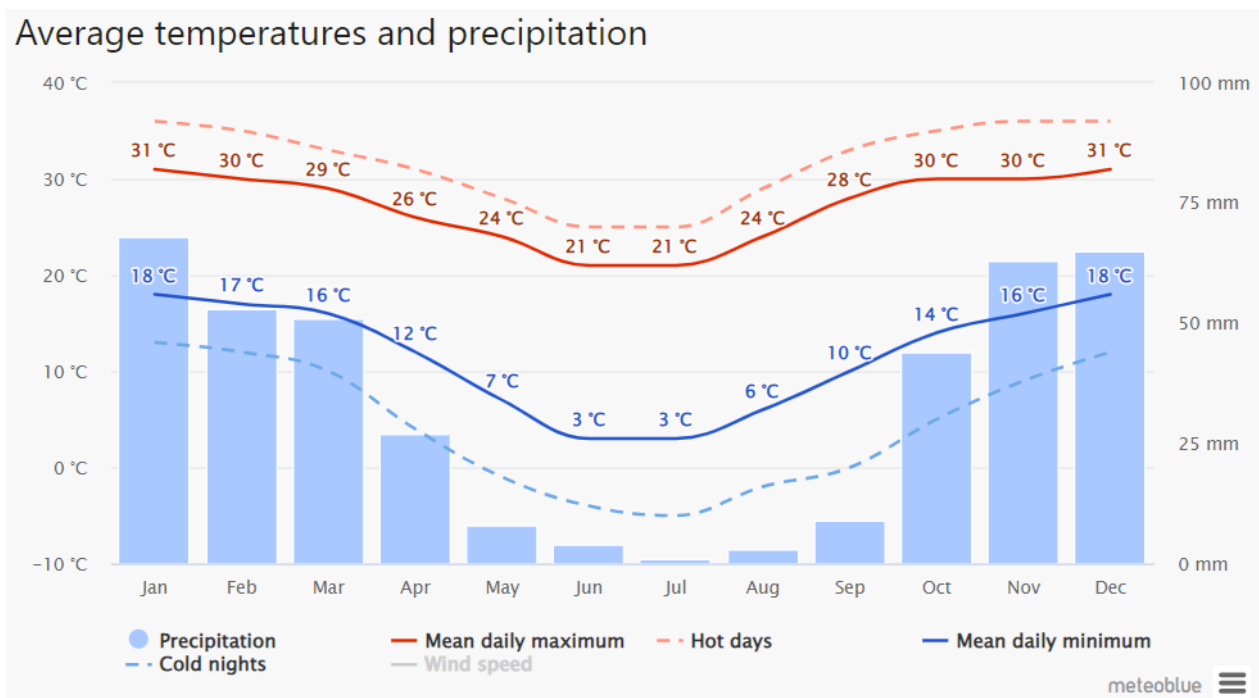


Figure 6.3: Climate graph for the Welkom area, Free State Province within which the proposed project site is located (source: Meteoblue 2022)

6.4. 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-I**) undertaken for this Scoping Report.

6.4.1. Topographical profile

The topography is characterised by slightly undulating plains with wetlands and / or drainage channels bisecting the area. The topography of the corridor can be described as generally favourable, when considering that most of the area consists of slopes of less than 1:5. The site is located at an altitude of between 900 and 940 m amsl.

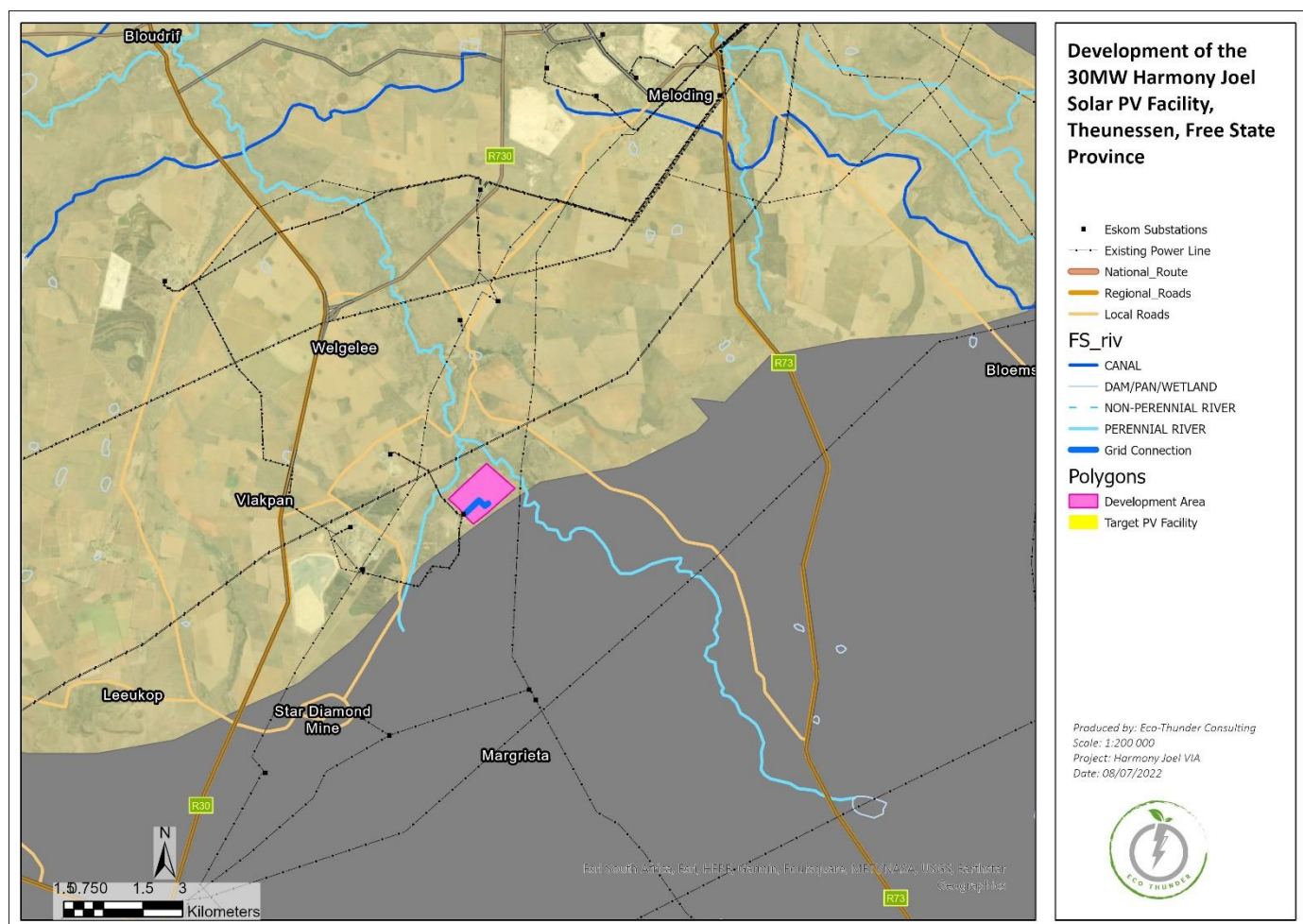


Figure 6.4: Topography for the Welkom area, in the Free State Province

6.4.2. Geology, Soils and Agricultural Potential

In terms of geology, the power line corridor is located in the central part of the Main Karoo Basin, east of the line of latitude 24°E that is important for the stratigraphy of the Karoo Basin. These old rocks are unconformably overlain by Quaternary sands and alluvium. The Main Karoo Basin covers a large proportion of South Africa and represents some 120 million years of deposition. At the base is the Carboniferous-Permian Dwyka Group, then the Permian aged Ecca Group, Permian-Triassic Beaufort Group, the Triassic-Jurassic Stormberg Group, all capped by the Drakensberg basalts. Intruding through the Karoo rocks are volcanic dykes of Jurassic age, and they were emplaced when the major Drakensberg basalts poured out and capped the Karoo sediments. These dolerite dykes are common in the area and because they are harder than the Karoo sediments they form ridges and hills.

The land type unit represented within the corridor include the Bd 20 and Dc16 land types. Bd20 is eutrophic; red soils not widespread upland duplex and marginalitic soils rare. Dc 16 is prisma-cutanic and/or pedocutanic diagnostic horizons dominant. In addition, one or more of vertic melanic red structured diagnostic horizons.

The A horizon is normally coarse textured, and the B horizon is fine textured. The coarse textured A horizon has a low water holding capacity and the structure is usually weak (Tekle, 2004). The slopes are typically covered by well weathered unstructured red or yellow soils, while the valleys have clay deposits washed down from the slopes.

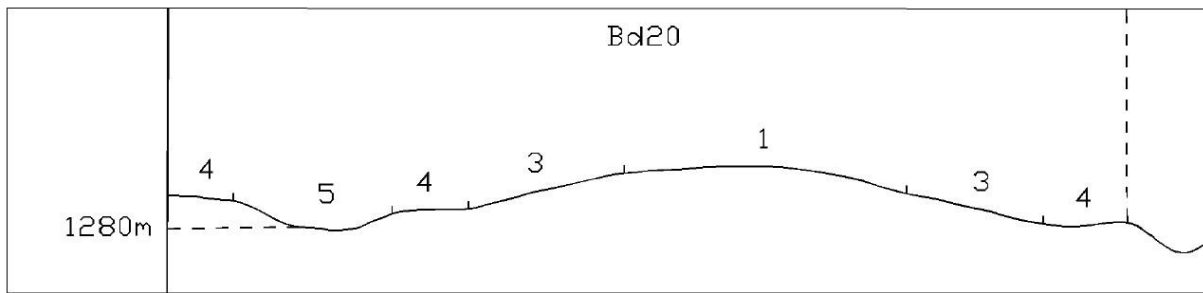


Figure 6.5: Illustration of land type (Land Type Survey Staff, 1972 - 2006)

6.4.3. Land Use

Land use activities within the broader region are predominantly described as maize farming, with some mining activity evident towards the west and of the proposed site. The mining activities intensify further north (beyond the study area boundary), towards Virginia, where predominantly gold and uranium are mined. Farm settlements or residences occur at irregular intervals throughout the study area. Some of these, in close proximity to the proposed development site,

Joel mine is situated to the south of the proposed development, significant mining activities can be seen in the surrounding area.

The site is accessible via the R30 and existing access roads.

Besides the large number of mines and mining infrastructure within the study area, there are numerous power lines and substations, predominantly associated with the mines.

The Land Cover Map (**Figure 6.6**) indicates the large extent of rainfed agriculture (maize fields), mining activities and the populated or built-up land within the study area.

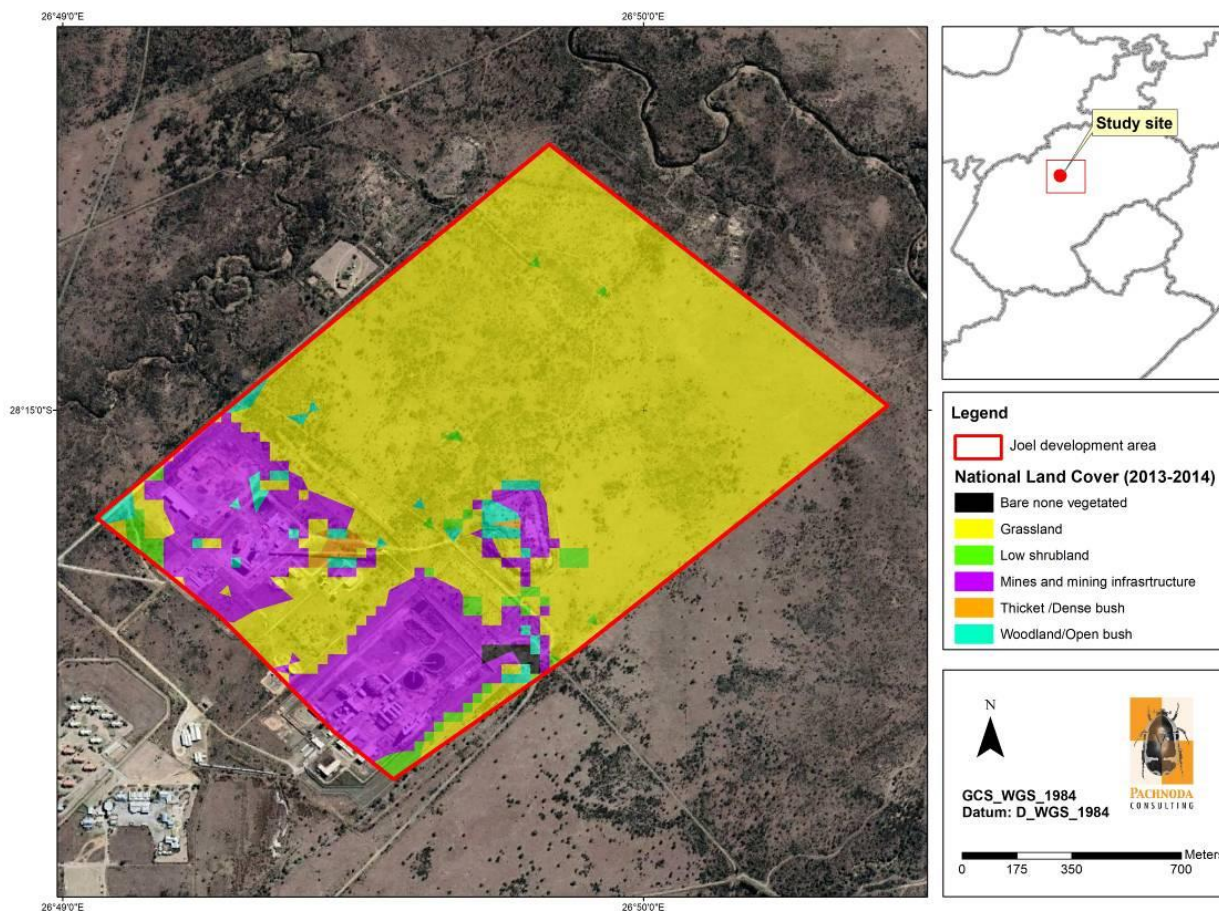


Figure 6.6: Illustration of land cover within the study area,

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

i. Vegetation Type

The vegetation type is currently listed as being of Least Concern (LC) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Appendix A: Map 2). Although it is quite heavily affected by transformation for dryland crop cultivation, it is not yet considered as severe enough to be regarded a Threatened Ecosystem. Remaining natural areas of this vegetation type will therefore not have a high conservation value, however, elements of conservation concern may still be present in natural areas. However, the site is also situated adjacent to the Doring River and from the survey it was also evident that the vegetation on the site is much more representative of the Highveld Alluvial Vegetation (AZa 5) type which is associated with riparian areas. This vegetation type is also listed as being of Least Concern (LC) which will also be taken into account in the assessment of the site.

The study will largely focus on these areas of remaining natural vegetation with the mining plant only discussed in overview. This is also confirmed by the National Biodiversity Assessment (2018) which indicates the site to still consist of natural Central Free State Grassland. The site is however also situated adjacent to the Doring River and the vegetation structure is much better affiliated with Highveld Alluvial Vegetation.



Figure 6.7: The study area is generally dominated by fairly dense thicket vegetation with a well- developed grass layer also being present.



Figure 6.8: A historical tailings dump in the central portion of the site is the only significant transformation of the natural portion of the study area.

The Doring River is situated adjacent to the site along the eastern, northern and western borders and may in some areas occur in close proximity to it and is therefore also relevant to the development. Associated with the Doring River is an extensive floodplain which may also extend onto the site. This is also dependent on the 1:100 year floodline of this watercourse. Within this floodplain an area of temporary saturation has also been identified which forms part of a floodplain wetland area although observed wetland conditions are only of a temporary nature and this area is therefore not clearly defined. These areas will all be assessed in detail in the wetland assessment section of the report.



Figure 6.9: The Doring River is situated adjacent to the site and is a fairly large watercourse.



Figure 6.10: A grass dominated floodplain wetland areas is also associated with the Doring River.

The main impacts affecting the area is associated with the mining operations here (Appendix A: Map 1). The plant itself covers a fairly large area which is completely transformed, associated with the mining plant is also a network of infrastructure which includes roads, dirt tracks and pipelines which contributes toward transformation. Along the east of the plant and centrally within the study area is a prominent tailings dump which also completely transforms the footprint of approximately 5 hectares both in terms of vegetation and topography. This transformation is however of limited extent and the majority of the area still consists of natural vegetation. The area is also being utilised as grazing for domestic livestock and this also contributes toward at least a moderate level of overgrazing and trampling. It should be clear that though significant transformation is caused by the mining operations, the majority of the site is still in a natural condition.



Figure 6.11. Impacts in the study area (red) are largely associated with the existing mining operations (yellow) with a tailings dump (blue) also situated in the central portion of the site. Overall the site is however dominated by natural vegetation (Google Earth 2022).

In general, the surface topography is still largely intact except for those areas consisting of mining operations as well as the tailings dump. The natural topography in the area consists of a plain but with a gentle slope towards the Doring River situated adjacent to the site. In closer proximity to the river, the slope also increases and erosion gullies and uneven terrain also become more prominent.

The site and the surrounding area is situated in a region experiencing moderate rainfall, with cold, dry winters and warm summers. Climate for the site can be extrapolated from rainfall and evaporation data from the weather station C4E009 (Zeebrugge@Sand-Vet). The site is located in an area with a rainfall of between 500 mm and 600 mm per annum with an average of 508.7 mm per year. Rainfall occurs largely as summer rainfall with a mean annual evaporation of between 1600 and 1799 mm/annum. The surface water runoff in the area is therefore not significantly high which results in a relatively low runoff for the area of between 20 - 50 mm according to a study by the Water Research Commission. As a result wetlands are uncommon in the area although several wetland areas are associated with the floodplain of the Doring River and the drainage lines and seasonal streams transecting the floodplain of the river.

The study area is situated on geology associated with the Volksrust Formation. The Volksrust Formation of the Eccca Group in the vicinity of Theunissen is dominated by underlying mudrock. However, the site and surroundings are dominated by quite deep alluvial deposits consisting of fine sand and silt soils. This is also one of the main drivers of the vegetation composition of the area.

As previously indicated, the terrestrial component of the study area is fairly uniform and dominated by thicket vegetation with interspersed grassland layer. The study area will therefore be discussed as a whole and elements of conservation value indicated where these were observed. The majority of the site still consists of natural vegetation which is dominated by a fairly dense thicket vegetation while a well-developed grass layer is also prominent. The density of thicket also varies over the site with the northern portion being densest. The survey has indicated that though a moderate level of disturbance is present the vegetation is still natural. Available resources indicate the area to consist of Central Free State Grassland

which is characterised by undulating plains dominated by grassland while lower lying areas may be affected by increased encroachment by the tree, *Vachellia karroo*, where overgrazing and trampling occurs (Mucina & Rutherford 2006). This was also found to be the case for this site. However, the lower lying areas along the rivers in this region, such as the Doring River, is normally dominated by Highveld Alluvial Vegetation. This vegetation type is characterised by flat topography with riparian thickets dominated by *Vachellia karroo*, accompanied by seasonally flooded grassland and disturbed herblands often dominated by exotic weeds (Mucina & Rutherford 2006). Again, this is also a very good description for the site. We can therefore conclude that the area consists of a mixture of Central Free State Grassland and Highveld Alluvial Vegetation which may also have been affected by increased encroachment of *Vachellia karroo* as a result of overgrazing and trampling. This sets a good baseline for the description of the site on which the following vegetation composition is based.

The vegetation on the site is clearly still natural and is mostly affiliated with Highveld Alluvial Vegetation though it does also contain elements of Central Free State Grassland. Both of these vegetation types are however listed as being of Least Concern (LC) and does not significantly contribute toward the sites conservation value. Though natural, the vegetation on the site also contains a significant degree of disturbance. The site also does not contain a significant species diversity and does not contain elements of high conservation value. However, as a natural area it must retain at least a Moderate level of sensitivity.



Figure 6.12: The thicket vegetation on the site can become quite dense in some areas and is characteristic of Highveld Alluvial Vegetation type.

Characteristics of the vegetation in its current state. The diversity of species, sensitivity of habitats and importance of the ecology as a whole.

Faunal characteristics

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species or very unique and sensitive habitats can potentially be a fatal flaw.

Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely.

6.4.5. Avifauna

Regional Vegetation Description

The proposed PV facility corresponds to the Grassland Biome and more particularly to the Dry Highveld Grassland Bioregion as defined by Mucina & Rutherford (2006). It comprehends an ecological type known as Central Free State Grassland (Mucina & Rutherford, 2006) (Figure 5).

From an avifaunal perspective it is evident that bird diversity is positively correlated with vegetation structure, and floristic richness is not often regarded to be a significant contributor of patterns in bird abundance and their spatial distributions. Although grasslands are generally poor in woody plant species, and subsequently support lower bird richness values, it is often considered as an important habitat for many terrestrial bird species such as larks, pipits, korhaans, cisticolas, widowbirds including large terrestrial birds such as Secretarybirds, cranes and storks. Many of these species are also endemic to South Africa and display particularly narrow distribution ranges. Due to the restricted spatial occurrence of the Grassland Biome and severe habitat transformation, many of the bird species that are restricted to the grasslands are also threatened or experiencing declining population sizes.

This vegetation type is confined the Free State Province and marginally also into Gauteng, where it is typical of the undulating plains from Sasolburg in the north to Dewetsdorp in the south. It is typified by short grassland dominated by *T. triandra*, while *Eragrostis curvula* and *E. chloromelas* tend to dominate areas where degradation is evident. Areas with high clay content are often earmarked by the occurrence of *Vachellia (=Acacia) karroo*.

The Central Free State Grassland is **Vulnerable** with small sections conserved in the Willem Pretorius and Koppies Dam Nature Reserves. It is transformed by cultivation and large sections are lost due to inundation during the construction of large reservoirs.

Conservation Areas, Protected Areas and Important Bird Areas

The study site does not coincide with any statutory/formal conservation area or Important Bird and Biodiversity Area (IBA). The nearest formal conservation area to the proposed study site is the Willem Pretorius Game Reserve, which is located 28 km east of the study site. The Willem Pretorius Game Reserve is also a recognised IBA (SA044). However, the H.J. Joel Private Nature Reserve is located adjacent to the eastern boundary of the study site

Annotations on the National Web-Based Environmental Screening Tool

Regulation 16(1)(v) of the Environmental Impact Assessment Regulations, 20145 (EIA Regulations) provides that an applicant for Environmental Authorisation is required to submit a report generated by the Screening Tool as part of its application. On 5 July 2019, the Minister of Environmental Affairs, Forestry and Fisheries published a notice in the Government Gazette giving notice that the use of the Screening Tool is compulsory for all applicants to submit a report generated by the Screening Tool from 90 days of the date of publication of that notice.

The Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their

proposed development footprint to avoid sensitive areas. The Screening Tool report will indicate the (preliminary) environmental sensitivities that intersect with the proposed development footprint as defined by the applicant as well as the relevant Protocols.

As the Screening Tool contains datasets that are mapped at a national scale, there may be areas where the Screening Tool erroneously assigns, or misses, environmental sensitivities because of mapping resolution and a high paucity of available and accurate data. Broad-scale site investigations will provide for an augmented and site-specific evaluation of the accuracy and 'infilling' of obvious and large-scale inaccuracies. Information extracted from the National Web-based Environmental Screening Tool (Department of Environmental Affairs, 2020), indicated that the study site and immediate surroundings hold a high sensitivity with respect to the relative animal species protocol (Figure 7) (report generated 25/04/2022):

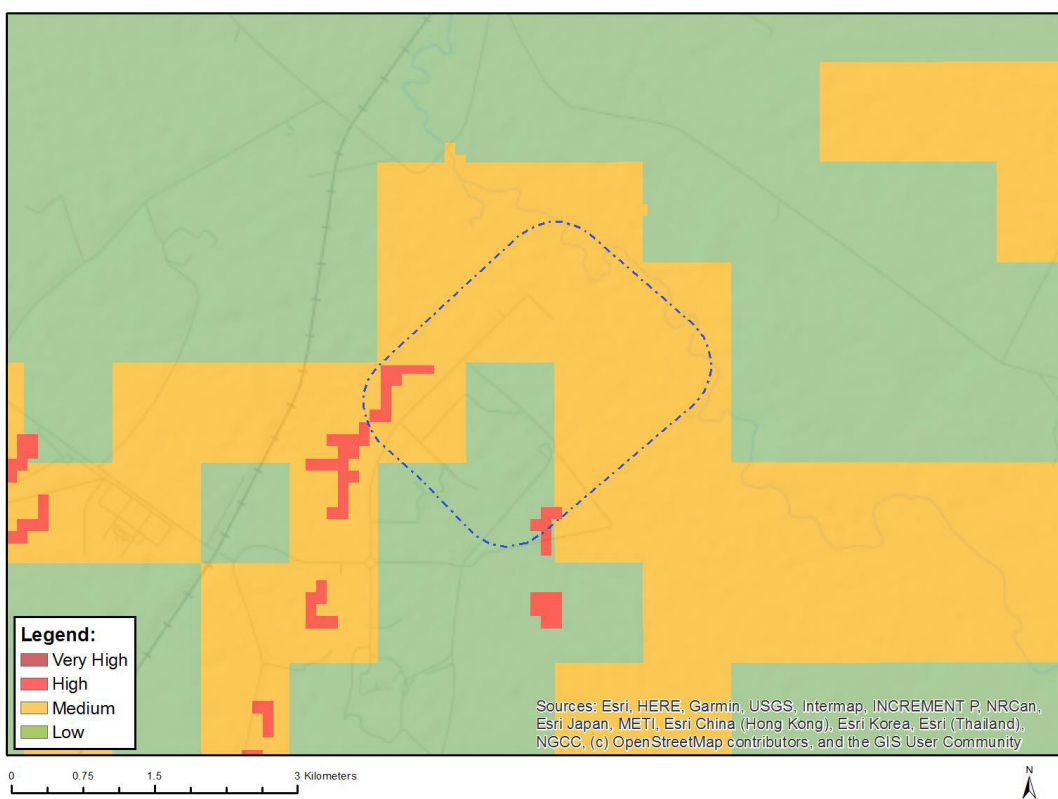


Figure 6.13: The animal species sensitivity of the study site and immediate surroundings according (500m buffer added to the site boundary) to the Screening Tool.

Sensitive features include the following:

Sensitivity	Feature(s)
High	Aves-Circus ranivorus
Low	Low sensitivity
Medium	Aves-Circus ranivorus
Medium	Mammalia-Hydrictris maculicollis

According to the results of the screening tool, a high probability of occurrence is evident for the endangered African Marsh Harrier (*Circus ranivorus*), which could potentially occur along a tributary of the Doring river. The probability for this species to occur along the Doring river systems, as well as the study site will be assessed during a detailed baseline (EIA) survey.

It is evident that the study site and immediate surroundings correspond to a low avian theme sensitivity

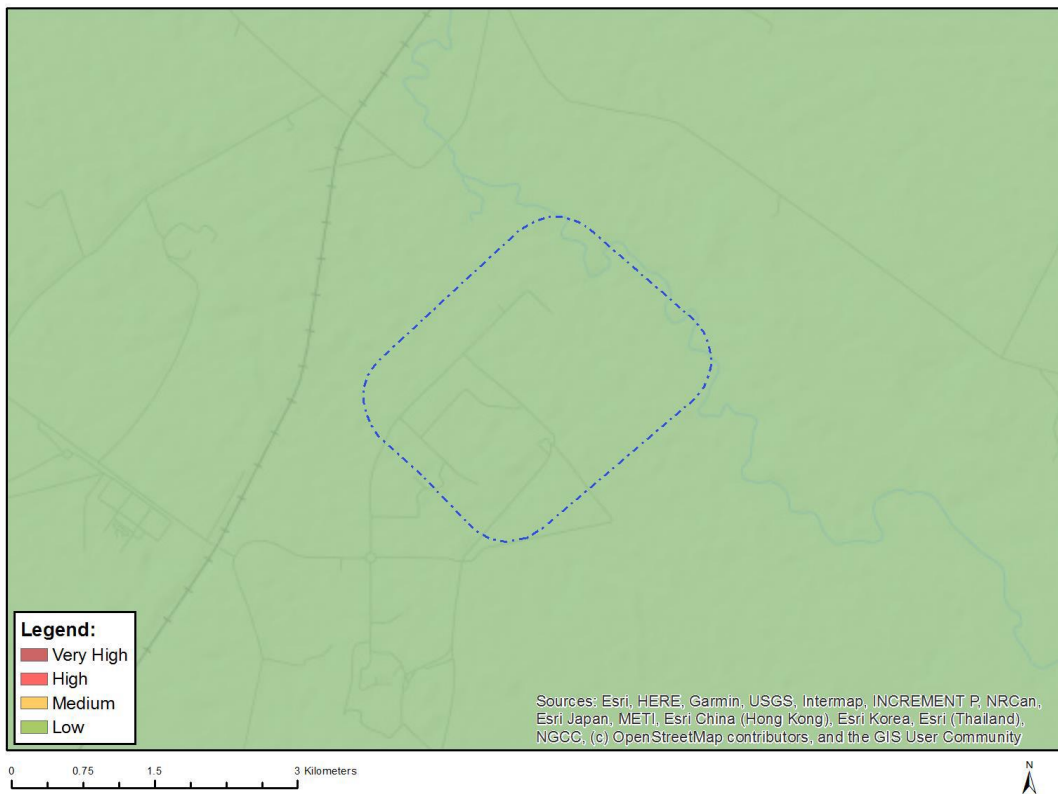


Figure 6.14: The relative avian sensitivity of the study site and immediate surroundings (500m buffer added to the site boundary) according to the Screening Tool.

Sensitive features include the following:

Sensitivity	Feature(s)
Low	Low sensitivity

However, the study site and immediate surroundings hold a very high sensitivity with respect to the relative terrestrial biodiversity theme (Figure 9):

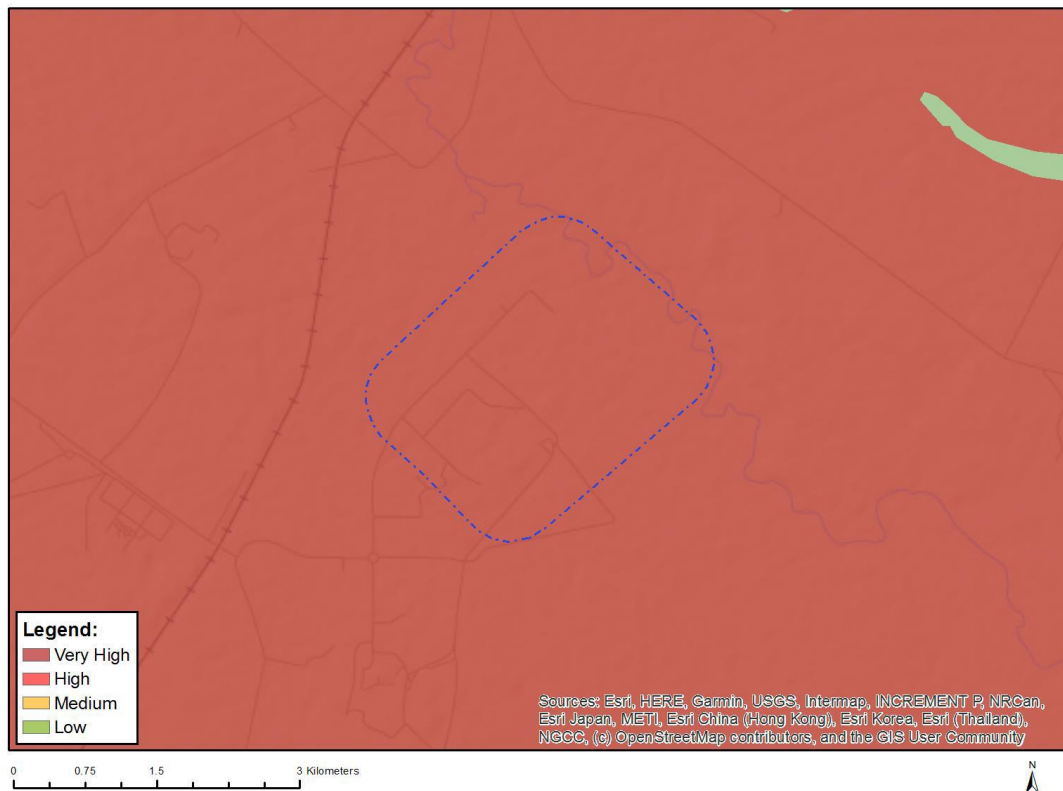


Figure 6.15: The relative terrestrial biodiversity sensitivity of the study site and immediate surroundings (500m buffer added to the site boundary) according to the Screening Tool.

Sensitive features include the following:

Sensitivity	Feature(s)
Very High	Critical Biodiversity Area 1
Very High	Critical Biodiversity Area 12
Very High	Ecological Support Area 1
Very High	Ecological Support Area 2
Very High	Protected Areas Expansion Strategy
Very High	H.J. Joel Private Nature Reserve

It is evident from the results of the Screening Tool report that part of the entire study area coincides with a Critical Biodiversity Area 1 and 2 (CBA 1 & 2) and an Ecological Support Area 1 and 2 (ESA 1 & 2) as per the Free State Biodiversity Plan (DESTEA, 2015). In addition, the study site is also located adjacent to the H. J. Joel Private Nature Reserve which is proposed to be included as part of the protected areas expansion strategy.

Preliminary avifaunal habitat types

Apart from the regional vegetation type, the local composition and distribution of the vegetation associations on the study area are a consequence of a combination of factors simulated by soil type, anthropogenic activities and grazing intensity (presence of livestock) which have culminated in three major broad-scale habitat units that deserve further discussion

- » **Open savannoid grassland with bush clumps:** This unit is dominant on the study site and covers a significant extent in surface area of the proposed PV facility. It is represented by two discrete floristic variations which also provide habitat for two discrete avifaunal associations. The first floristic variation consists of open grazed Central Free State Grassland dominated by *Themeda triandra*. It is occupied by a grassland bird composition dominated by insectivorous and granivore passerine bird species such as Desert Cisticola, (*Cisticola aridulus*), Ant-eating Chat and Cape Longclaw (*Macronyx capensis*). The overall bird richness was low.

The bush clumps form a prominent mosaic characterised by the dominance of a woody layer of *Vachellia* karoo on clay soils. The eminent increase in vertical heterogeneity provided by the woody layer is colonised by a "Bushveld" bird association consisting of insectivorous passerines such as Black-chested Prinia (*Prinia flavicans*), Chestnut-vented Warbler (*Curruca subcoerulea*), Kalahari Scrub Robin (*Cercotrichas paena*), Neddicky (*Cisticola fulvicapilla*), African Red-eyed Bulbul (*Pycnonotus nigricans*), Orange-river White-eye (*Zosterops pallidus*) as well as granivores such as Yellow Canary (*Crithagra flaviventris*), Blue Waxbill (*Uraeginthus angolensis*) and Black-faced Waxbill (*Brunhilda erythronotos*). Non-passerine bird taxa are represented by Ring-necked Dove (*Streptopelia capicola*), Acacia Pied Barbet (*Tricholaema leucomelas*) and White-backed Mousebird (*Colius colius*).

- » **Transformed areas:** These areas are represented by build-up land and mining infrastructure. These features are invariably artificial and present an urban and industrial landscape which is colonised by generalist bird taxa such as Speckled Pigeon (*Columba guinea*), House Sparrow (*Passer domesticus*) and Cape Sparrow (*Passer melanurus*).
- » **Doring river and associated tributaries:** The perennial Doring River and one of its tributaries occur north of the study site (approximately 200m from the study site boundaries). The system is characterised by a very narrow marginal and floodplain zone, and relatively deeply incised banks. Therefore, the marginal zone is often colonised by a variety of facultative wetland vegetation which include amongst others taxa such as *Imperata cylindrica*, *Pennisetum* spp., *Miscanthus cf. junceus*, while the riverbanks are covered on vegetation that is similar to the savannoid grassland habitat although the prevalence of woody vegetation is higher and dense (e.g. *Asparagus laricinus*). The marginal zone provides potential habitat for bird species such as the Levaiant's Cisticola (*Cisticola tinniens*) and African Stonechat (*Saxicola torquatus*), while the river it canal itself (open surface water) provides foraging habitat for waterfowl such as the Yellow-billed Duck (*Anas undulata*), South African Shelduck (*Tadorna cana*) and Egyptian Goose (*Alopochen aegyptiacus*).

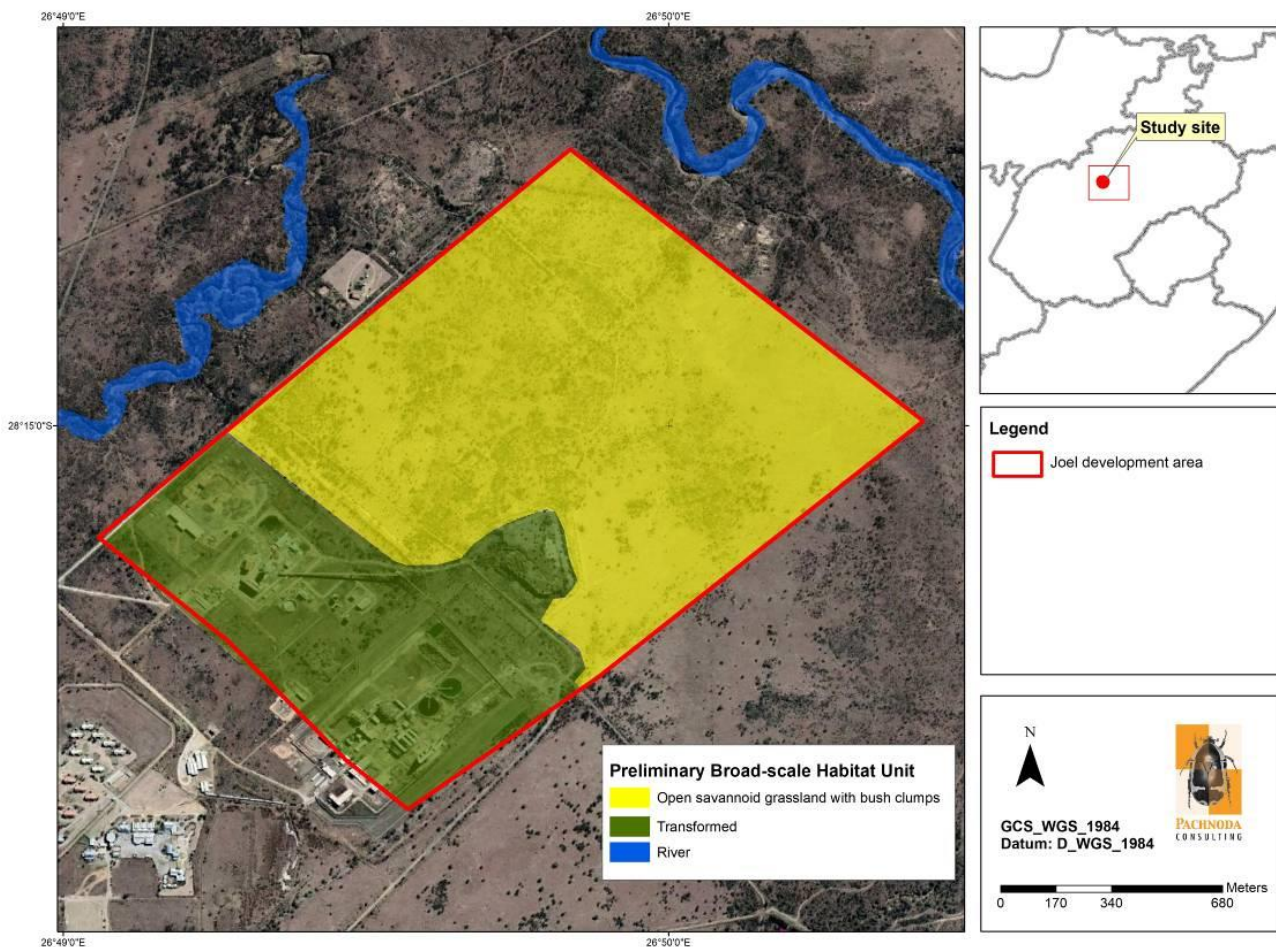


Figure 6.16: A preliminary habitat map illustrating the avifaunal habitat types on the study site and immediate surroundings (the habitat types are subject to change pending the outcome of a detailed baseline surveys).

Species Richness and Predicted summary statistics

Approximately ~158 bird species have been recorded within the study area refer to (Appendix 1 & Table 1), although it is more likely that between 90-100 bird species could occur within the physical boundaries of the study site (according to the habitat types and the ecological condition thereof). The richness was inferred from the South African Bird Atlas Project (SABAP2)⁹ (Harrison et al., 1997; www.sabap2.birdmap.africa) and the presence of suitable habitat in the study area. This equates to 16 % of the approximate 987¹⁰ species listed for the southern African subregion¹¹ (and approximately 18 % of the 871 species recorded within South Africa¹²). However, the species richness obtained from the pentad grids corresponding to the study area (c. 2810_2645, 2810_2650, 2815_2645 and 2815_2650) range between 73 and 132 species, with an average number of 46.5 species for each full protocol card submitted (for observation of two hours or more; range= 19-79 species).

⁹ The expected richness statistic was derived from pentad 2810_2645, 2810_2650, 2815_2645 and 2815_2650 totalling 158 bird species (based on 21 full protocol cards).

¹⁰ *sensu* www.zestforbirds.co.za (Hardaker, 2020), including four recently confirmed bird species (vagrants).

¹¹ A geographical area south of the Cunene and Zambezi Rivers (includes Namibia, Botswana, Zimbabwe, southern Mozambique, South Africa, eSwatini and Lesotho).

¹² With reference to South Africa (including Lesotho and eSwatini (BirdLife South Africa, 2022)).

According to Table 1, the study area is poorly represented by biome-restricted¹³ (see Table 2) and local endemic and near-endemic bird species. It supports ca. 30 % of the near -endemic species present in the subregion.

Table 6.4: A summary table of the total number of species, Red listed species (according to Taylor et al., 2015 and the IUCN, 2022), endemics and biome-restricted species (Marnewick et al., 2015) expected (*sensu* SABAP2) to occur in the study site and immediate surroundings.

Description	Expected Richness Value
Total number of species*	158 (18 %)
Number of Red Listed species*	4 (3 %)
Number of biome-restricted species – Namib-Karoo and Kalahari-Highveld Biomes)*	2 (7 %)
Number of local endemics (BirdLife SA, 2022)*	2 (5 %)
Number of local near-endemics (BirdLife SA, 2022)*	5 (16 %)
Number of regional endemics (Hockey et al., 2005)**	13 (12 %)
Number of regional near-endemics (Hockey et al., 2005)**	18 (30 %)

Table 6.5: Expected biome-restricted species (Marnewick et al, 2015) likely to occur on the study site and immediate surroundings.

Species	Kalahari-Highveld	Namib-Karoo	Expected Frequency of occurrence
Kalahari Scrub-robin (Cercotrichas paena)	X		Common
Sickle-winged Chat (Emarginata sinuata)		X	Vagrant and highly nomadic (known from a single record during 22 April 2022; <i>sensu</i> SABAP2)

Bird species of conservation concern

Table 6.5 provides an overview of bird species of conservation concern that could occur on the study site and immediate surroundings based on their historical distribution ranges and the presence of suitable habitat. According to Table 3, a total of four species could occur on the study area which include two globally threatened species and two regionally threatened species.

It is evident from Table 3 that the occurrence of threatened species on the study site was low (*sensu* SABAP2). It is evident that suitable habitat for the occurrence of the globally endangered Maccoa Duck (*Oxyura maccoa*) and the regionally endangered African Marsh Harrier (*Circus ranivorus*) was absent, thereby suggesting that the probability that these species could occur within the physical boundaries of the study site is low.

In addition, the open grassland-bush clump mosaics provides ephemeral foraging habitat for the occurrence of the globally endangered Secretarybird (*Sagittarius serpentarius*) and the regionally

¹³ A species with a breeding distribution confined to one biome. Many biome-restricted species are also endemic to southern Africa.

vulnerable Lanner Falcon (*Falco biarmicus*). The former species was probably displaced from the study site due to livestock farming regimes and mining activities although suitable habitat was observed approximately 5 km south-east of the study site at the border between Farm Leeuwfontein 256 and Farm Schoemanskop 654. The latter species is regarded as an occasional foraging visitor to the study site.

Table 6.6: Bird species of conservation concern that could utilise the study site based on their historical distribution range and the presence of suitable habitat. Red list categories according to the IUCN (2022)* and Taylor et al. (2015)

Species	Global Conservation Status*	National Conservation Status**	SABAP2 reporting rate	Preferred Habitat	Potential Likelihood of Occurrence
<i>Circus ranivorus</i> (African Marsh Harrier)	-	Endangered	(ad hoc record)	Restricted to permanent wetlands with extensive reedbeds.	Probably absent from the study site and adjacent Doring river due to the absence of extensive floodplains and reedbeds (suitable habitat absent) Only known from a single old observation during 2008 (sensu SABAP2). in the study region.
<i>Falco biarmicus</i> (Lanner Falcon)	-	Vulnerable	Not observed/recorded	Varied, but prefers to breed in mountainous areas although also using old disused mine voids.	Could be an occasional foraging visitor to the study site.
<i>Oxyura maccoa</i> (Maccoa Duck)	Endangered	Vulnerable	11.11 (ad hoc record)	Large saline pans and shallow impoundments.	Probably absent on the physical study site due to the absence of suitable habitat. It was last recorded during 07 April 2008 on the wider study region (sensu SABAP2).
<i>Sagittarius serpentarius</i> (Secretarybird)	Endangered	Endangered	9.5	Prefers open grassland or lightly wooded habitat.	An irregular foraging visitor to the study site. Historically displaced due to agricultural and mining activities. It is known from two records obtained from grid 2815_2650, where optimal habitat was observed approx. 5km south-east of the study site at the border between Farm Leeuwfontein 256 and Farm Schoemanskop 654.

Land cover, land use and existing infrastructure.

According to the South African National dataset of 2013-2014 (Geoterrainimage, 2015) the study site comprehends the following land cover categories (**Figure 6.17**):

Natural areas:

- Grassland;
- Low shrubland; and
- Open bush;

Transformed areas:

- Mines and quarries.

From the land cover dataset it is evident that most of the study site is predominantly covered in natural grassland which is part of the Central Free State Grassland vegetation type. However, mining activities and mine-related infrastructure occurs on the western and southern section of the study site. The majority of the study site (consisting of natural grassland) is primarily vacant and used for livestock grazing. Note that the Doring river and one of its tributaries are located north of the study site (within 200m from the study site boundary).

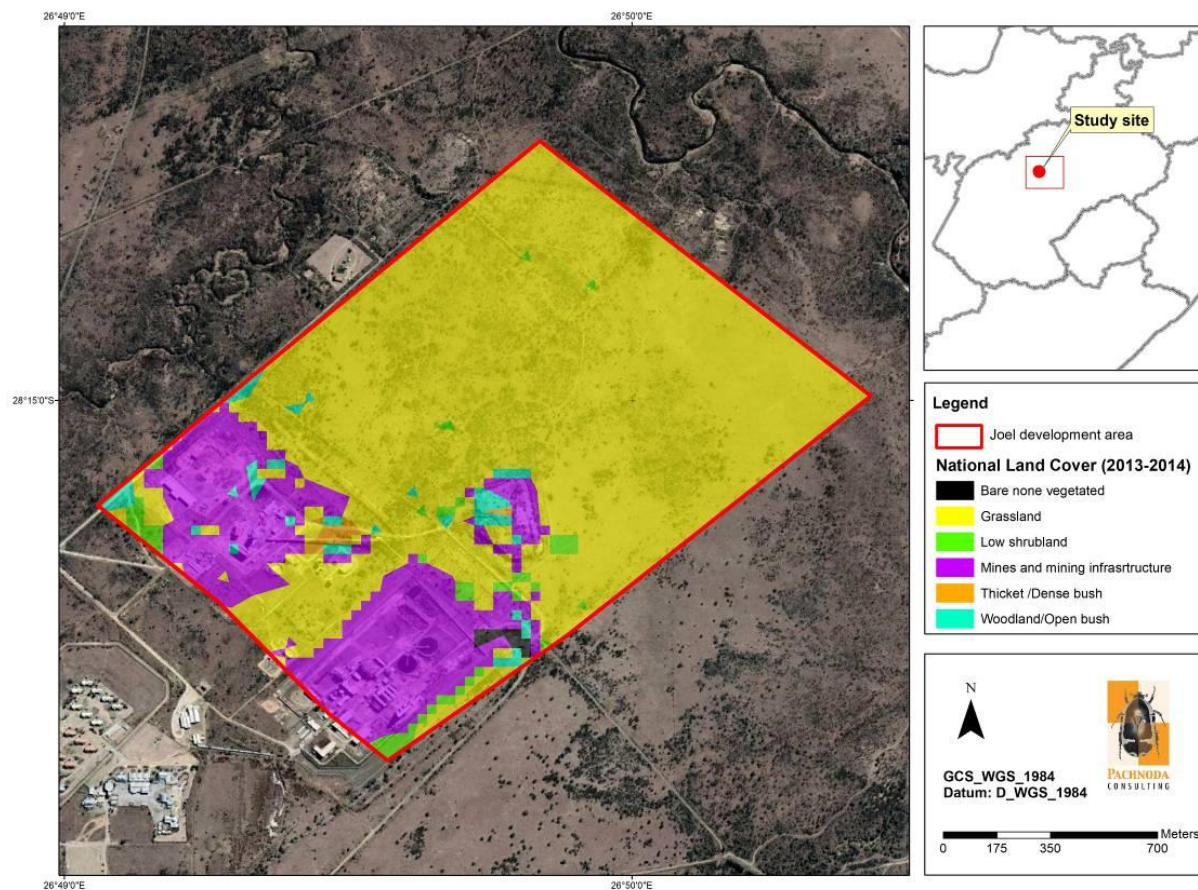


Figure 6.17: A map illustrating the land cover classes (Geoterrainimage, 2015) corresponding to the proposed study site and immediate surroundings.

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

6.5.1. State of the Site

The potentially affected footprint related to the proposed PV facility is located across the Joel mining area, approximately 12 km north-east of the town of Odendaalsrus in the goldfields region of the Lejweleputswa district of the Free State Province. The footprint is located in the vicinity of the Free State Doring meandering river system. Portions of the affected property are located on the terraces of this drainage system, with evidence of banded chert nodules (4-11cm in maximum diameter – a high quality raw-material for artefact manufacture), and thick fluviially deposited sands. Importantly, only marginal topsoil formation was evident in the area, which may be a further indicator of the erosional effects of a past active high-energy river system. Several remnants of dam structures were recorded, implicating the historical anthropogenic capture of naturally available water in the summer rainfall season (CJL3 and CHL6). Although the affected area is relatively flat, there are more resistant raised areas that are richer in archaeological materials relative to the deflated areas between. There is also more evidence for soil formation in the raised portions, indicating that parts of the landscape have been differentially eroded by natural (flooding) and/or anthropogenic processes (agriculture) over time.

6.5.2. Archaeology

According to Fourie (2021), "The Free State has a rich archaeological and historical history going back millions of years and includes significant aspects such as Later Stone Age rock art, Battlefields and Iron Age stonewalled enclosures. The general surroundings of the study area became a melting pot of contact and conflict as it represents one of many frontiers where San hunter-gatherers, Nguni and Sotho-Tswana agro-pastoralists, Dutch Voortrekkers and British Colonists all came together. The ravages of war also swept across these plains, and in particular the South African War (1899-1902) as well as the Boer Rebellion (1914-1915)." No heritage resources of significance were identified by Van der Walt (2013) in his assessment of a nearby farm. Van der Walt (2013) notes that "some MSA finds might be possible around pans on the farm. It is important to note that the lack of sites can be attributed to a lack of sustainable water sources (no pans exist in the development footprint) in the development area as well as the lack of raw material for the manufacturing of stone tools. No Sites dating to the Early or Middle Iron Age have been recorded or are expected for the study area. The same goes for the Later Iron Age period where the study area is situated outside the western periphery of the distribution of Late Iron Age settlements in the Free State. However to the north of the study area, ceramics from the Thabeng facies belonging to the Moloko branch of the Urewe tradition were recorded at Oxf 1 and Platberg 32/71 (Maggs 1976, Mason 1986)".

Based on the known archaeological sensitivity of the broader context, it is unlikely that the proposed development will impact on significant Stone Age or Iron Age archaeological heritage; however it is possible that informal or unmarked graves may be present within the development area.

6.5.3. Palaeontology

According to the SAHRIS Palaeosensitivity Map the development sites are underlain by sediments of moderate and very high fossil sensitivity (Figure 4a). The Adelaide Subgroup of the Beaufort Group is the very highly sensitive formation and caenozoic regolith is the moderately sensitive formation underlying the development area according to the extract from the CGS 2826 Winberg Geology Map (Figure 4b). According to the updated biostratigraphy (Smith et al., 2020), the whole of the Adelaide Subgroup has been

divided into five Assemblage Zones based on the dominant or temporally exclusive vertebrate fossils. If vertebrate fossils were common in this region and had been well mapped then the specific Assemblage Zone would have been indicated in the literature. Common names for the fossils that could occur here are fish, amphibians, reptiles, therapsids, terrestrial and freshwater tetrapods, as well as freshwater bivalves, trace fossils including tetrapod trackways and burrows. Where the vertebrates do not occur it is possible to find sparse to rich assemblages of vascular plants of the late *Glossopteris* Flora, including some petrified logs), and insects are also prevalent at some sites.

A desktop Palaeontological assessment (2013) was completed by Millsted for an adjacent development which is of relevance here. Millsted (2013) notes that "The Cainozoic regolith and the Adelaide Subgroup are both potentially fossiliferous and their stratigraphic equivalents are known to contain scientifically important fossil assemblages elsewhere in South Africa. Accordingly, it may be reasonably expected that significant fossils may be present within the project area." He goes on to note that "Thus, the historical farming processes have probably destroyed any fossil materials that may have been present at surface in these areas. Similarly, where present the regolith cover would hide any fossils contained within the underlying Adelaide Subgroup from discovery. The potential for a negative impact on the fossil heritage of the area can be quantified in the following manner. Any fossil materials that may have been present at/or near the surface in the cultivated regolith will have been historically destroyed and the likelihood of any negative impact is categorised as negligible. The possibility of a negative impact on the depth interval between the maximum depth of ploughing and the maximum depth of excavations within the regolith is categorised as low (due to the scarcity of fossils in general)."

6.6. Visual Quality

The study area lies completely within the Middle Vaal Water Management Area (WMA) and entirely within the Highveld ecoregion (Kleynhans et al., 2005). The topography is characterised by slightly undulating plains with wetlands and / or drainage channels bisecting the area. Most properties situated within a 5km radius of the site is being used for livestock and crop cultivation.

The main characteristics of the study area includes mining, crop and livestock farming. Tourist attractions mostly occur on the outer edges of the study area, 20km radius, with the closest being the Allemanskraal Dam, approximately 16km South-East. The residential component of the study area includes farmsteads with associated workers housing as well as the towns of Virginia and Ventersburg and the townships of Meloding and Mmamahabane.

The built environment surrounding the proposed development area ranges from high density low-income housing and informal rural type settlements to large mining and agriculture developments. Developments located adjacent to the proposed settlement are informal settlement, with limited infrastructure that only meets RDP Standards. Social facilities within the area are lacking, with the nearest school being located some few kilometres from the site. No infrastructure is currently in place on site; however, electricity, sewer and water will be connected onto existing bulk infrastructure currently servicing the surrounding areas. One access route to the site is proposed, via existing roads. Access to the majority of the area will take place from Main road (where a 60 – 80 m length of 6 m wide tarred road surface is proposed)

Land use activities within the broader region are predominantly described as maize farming, with some mining activity evident towards the west (BEISA mine) of the proposed site. The mining activities intensify further north (beyond the study area boundary), towards Virginia and Welkom, where predominantly gold

and uranium are mined. Farm settlements or residences occur at irregular intervals throughout the study area. Some of these, in close proximity to the proposed development site.

The Visual setting of proposed PV facility



Figure 6.18. View of property from R30

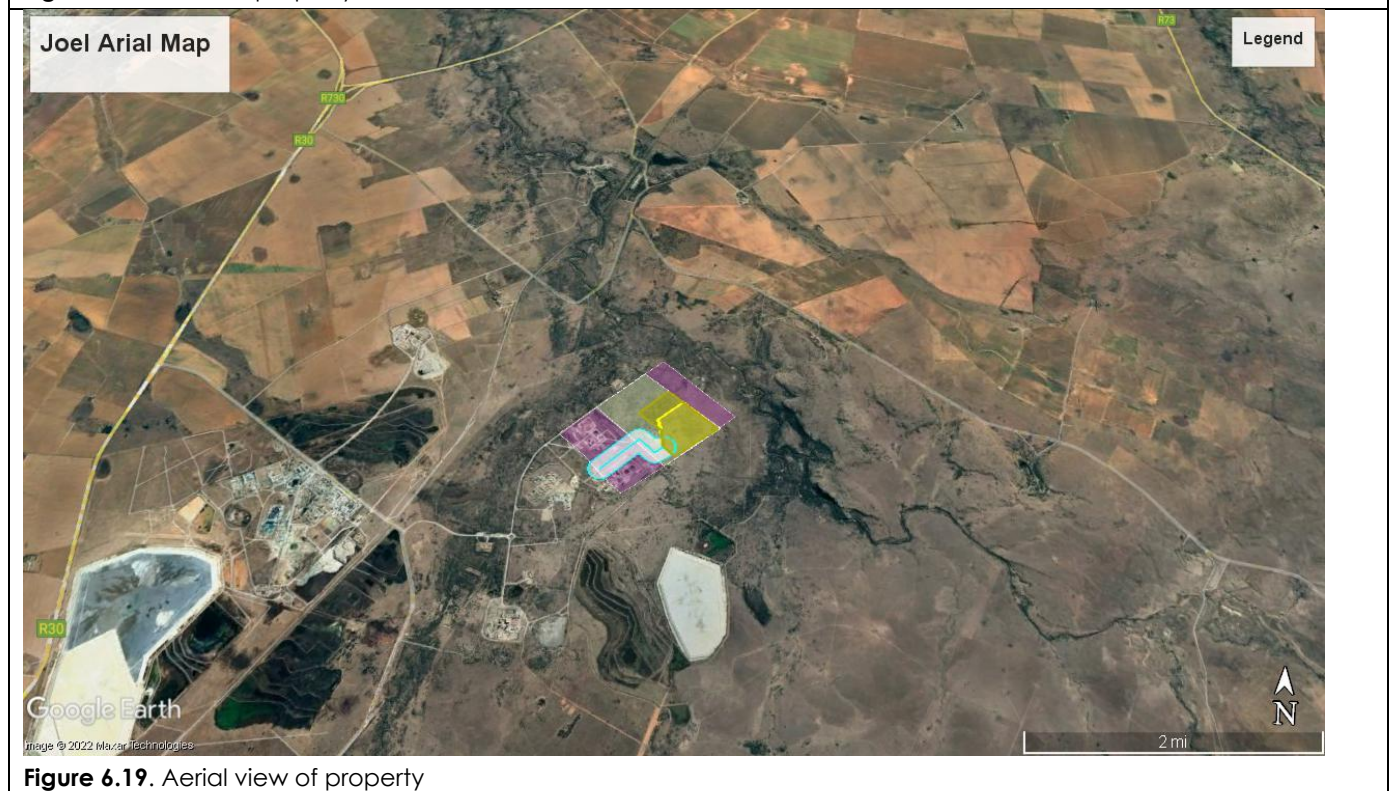


Figure 6.19. Aerial view of property

6.7 Social Context

6.7.1 Profile of the Broader Area

Masilonyana Local Municipality is named after the mountain in the area. It is one of five municipalities in the district extending over 6 618km². It is situated between the province's biggest municipality, Mangaung Metro, in the south and the second-biggest municipality, Matjhabeng, in the north. The municipality is as a result of the merging of former Transitional Local Councils which included Theunissen, Brandfort, Winburg, Soutpan and Verkeerdevlei.

It is an impoverished semi-urban area with a high unemployment rate. The municipality plays host to two toll plazas on two major roads in the province; the Verkeerdevlei Plaza on the N1 is the last before entering Bloemfontein from the north, and the Brandfort Plaza on the former R30 (now ZR Mahabane Road) is situated between Brandfort and Bloemfontein.

Brandfort is also known for its rich political history, which includes the National Military Museum on a farm that used to be a concentration camp during the Anglo-Boer War and the Winnie Mandela House, where Mandela was sentenced to House Arrest during the State of Emergency in the 1980s. Theunissen is also situated on the ZR Mahabane Corridor between Bloemfontein and Welkom, and hosts the three mines within the municipal jurisdiction. Winburg has economic potential because of its location, which is 100km west of Bloemfontein, and its linking of Bloemfontein with Johannesburg, Cape Town and Durban. It prides itself with the Voortrekker Monument as its Heritage Site, and Masilonyana boasts several game reserves across all its towns. The municipality prides itself on its tourist destinations, such as the Florisbad National Quaternary Research Station. This is where the first human skull was discovered. There are also cooperatives in Soutpan working on the salt lakes to produce salt. The key economic sectors are agriculture, mining, and community services. The Municipality also experienced the highest tourism spending that increased from 3.9% in 2008 to 5.1% in 2017.

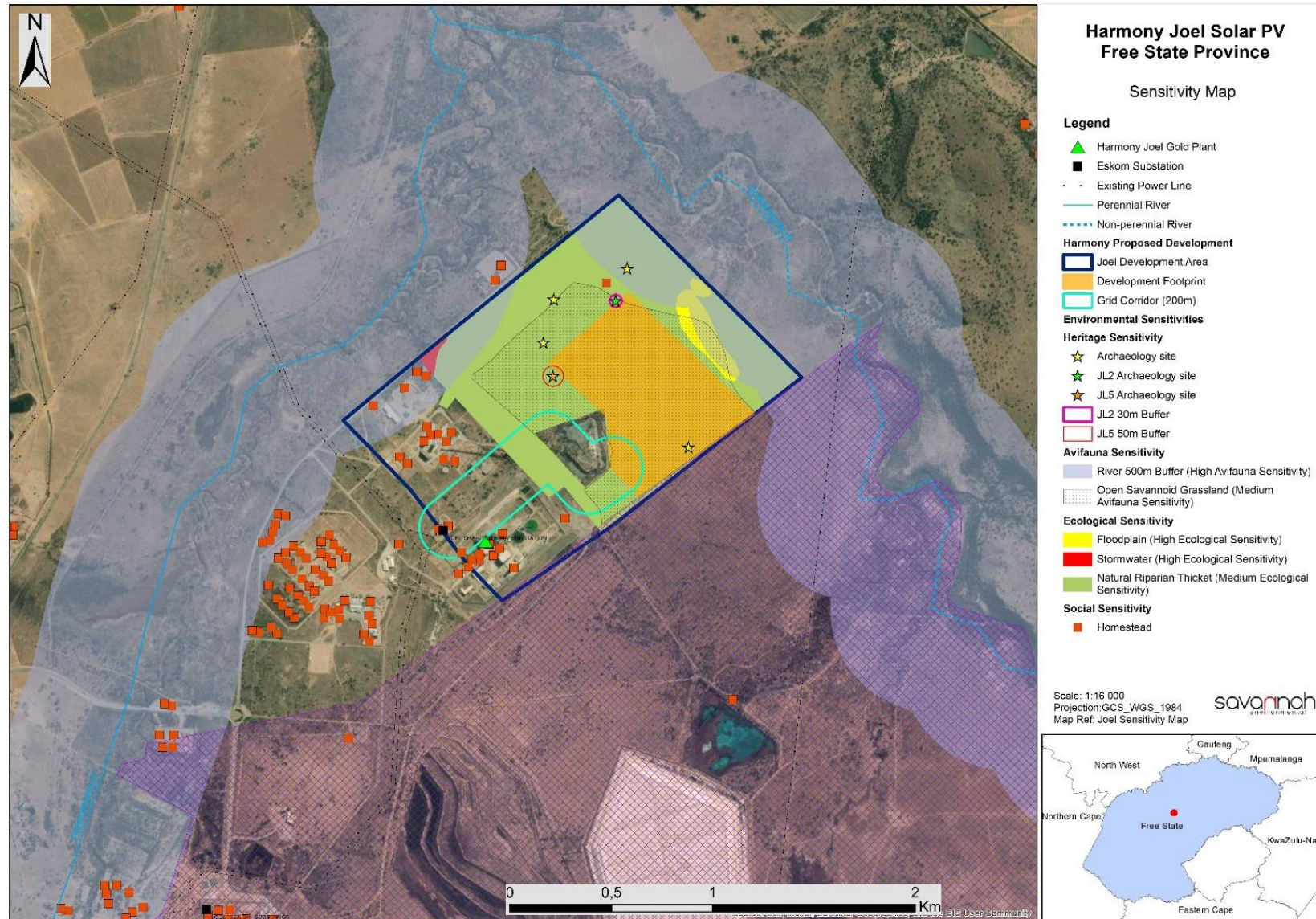


Figure 6.20: Indication of the location of social receptors identified

CHAPTER 7: SCOPING OF POTENTIAL IMPACTS

This Chapter provides an overview of the potential impacts and risks associated with the Harmony Joel Solar PV Facility, including associated infrastructure, as identified at this stage of the process through a specialist studies.

Potential environmental impacts and risks associated with the development of PV solar energy generation facilities, as described in the IFC's Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (2015), include:

- » Construction phase impacts, such as temporary air emissions (dust and vehicle emissions), noise, solid waste and wastewater generation, and Occupational Health and Safety (OHS) issues such as the risk of preventable accidents leading to injuries and/or fatalities.
- » Land matters, such as land acquisition procedures and in particular involuntary land acquisition/resettlement.
- » Landscape and visual impacts, such as the visibility of the project within the wider landscape and associated impacts on landscape designations, character types and surrounding communities.
- » Ecology and natural resources, such as habitat loss / fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species.
- » Cultural heritage, such as 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, such as impacts associated with the transportation of materials and personnel on project-affected communities.
- » Water usage, such as the cumulative water use requirements in arid areas where local communities rely on scarce groundwater resources.

This chapter serves to describe and evaluate the identified potential environmental impacts relevant and specific with the construction and operation phases of the 18MW Harmony Joel Solar PV Facility, and to make recommendations for further studies required to be undertaken in the EIA phase.

The project site considered for the Harmony Joel Solar PV Facility includes Portion 0 of Farm Leeuwbult 580a project site of approximately 1000ha in extent. Within this project site, a development area of approximately 220ha has been investigated during this Scoping Phase to determine the environmental suitability of the site. The study will provide an indication of the areas of sensitivity that the developer would need to take into consideration in the planning of the layout of the Harmony Joel Solar PV Facility within the development area.

The majority of the environmental impacts are expected to occur during the construction phase. Environmental issues associated with construction and decommissioning activities of the PV facility and associated infrastructure are similar and include, among others:

- » Impact on ecology, including flora and fauna.
- » Impact on avifauna.
- » Impact on soils, geology, agricultural potential and land use.
- » Impact on heritage resources (including archaeology and palaeontology).

- » Social impacts (positive and negative).
- » Visual impacts.

Environmental issues specific to the operation of the PV facility and associated infrastructure could include, among others:

- » Long-term loss of protected species (flora, fauna, avifauna) or conservation-worthy habitats.
- » Change in land-use for the footprint of the facility.
- » Visual impacts (negative viewer perceptions and visibility of the facility).
- » Social impacts (positive and negative).

In order to appropriately identify, assess and, as far as possible, avoid or mitigate potential impacts and risks that may be associated with the development, construction, operation and decommissioning of the Harmony Joel Solar PV Facility, Savannah Environmental commissioned a team of independent specialists with relevant scientific knowledge and expertise in the biophysical (i.e. biotic and abiotic) and socio-economic environments. Copies of the specialists' Scoping level assessments are included in **Appendices D – I** of this Scoping Report.

Section 7.2 provides the findings of the scoping study undertaken for the construction and operation phases of Harmony Joel Solar PV Facility. Those impacts associated with construction can also be expected to be associated with the decommissioning phase (however, to a lesser extent as the project site would have previously undergone transformation and disturbance during construction). The findings must be read in conjunction with the specialist reports attached as **Appendices D – I** of this Scoping Report. Potential impacts associated with the project are evaluated, and recommendations are made regarding further studies required within the EIA Phase.

A summary of the potential cumulative impacts that may be associated with the project is provided in **Section 7.3**. These impacts are associated with the scale of the project when considered together with other similar developments within the region and will be confirmed and assessed within the EIA Phase of the project.

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

This chapter serves to identify the potential environmental impacts associated with the development of the Harmony Joel Solar PV Facility from a desktop level. This chapter includes the following information required in terms of the EIA Regulations, 2014 - Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
2(g)(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts (aa) can be reversed (bb) may cause irreplaceable loss of resources and (cc) can be avoided, managed or mitigated.	The impacts and risks identified to be associated with the construction and operation phase of Harmony Joel Solar PV Facility have been included in Section 7.3 . Impact tables have been included for each field of study which considers the nature, significance, consequence, extent, duration and probability of the impacts, as well the reversibility of the impacts, the loss of resources and avoidance, management or mitigation.

Requirement	Relevant Section
2(g)(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 Harmony Joel Solar PV Facility have been included in Section 7.3.
(g)(viii) the possible mitigation measures that could be applied and level of residual risk	Possible mitigation (specifically relating to the avoidance of sensitive areas) has been included in Section 7.3.

7.2 Evaluation of Potential Impacts associated with the Construction Phase, Operation and Decommissioning phases

7.2.1 Impacts on Ecology and Freshwater Resources

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, nesting sites 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.

Impacts associated with the construction, operation and decommissioning phases of the PV facility and associated infrastructure on ecology include the following:

- » Loss of vegetation and consequently habitat and species diversity as a result.
- » Loss of protected, rare or threatened plant species.
- » Impacts on watercourses, wetlands or the general catchment.
- » The impact that the development will have on exotic weeds and invasive species, both current and anticipated conditions.
- » Any increased erosion that the development may cause.
- » Fragmentation of habitat, disruption of ecological connectivity and -functioning in terms of the surrounding areas.
- » Impacts that will result on the mammal population on and around the site.
- » Any significant cumulative impacts that the development will contribute towards.

Sensitivity Analysis of the Site

Habitat diversity and species richness:

The site itself is dominated by a mosaic of thicket and grassland and represents a moderate habitat diversity. As a result, species diversity on the site also fairly uniform and does not exceed moderate values. The Doring River and its banks significantly contribute toward habitat and species diversity but does not form part of the development footprint.

Presence of rare and endangered species:

The remaining natural vegetation on the site is generally fairly uniform and species diversity remain moderate over the entire site. There are however still a few protected plant species and these also retain a significant conservation value. These include *Boophone distichia*, *Eucomis autumnalis* and *Olea europaea* subsp. *africana*.

Ecological function:

The ecological function of the site is still largely intact though some modification, mostly of the surroundings are present. The site functions as habitat for a variety of fauna, supports specific vegetation types and also function in support of the Doring River adjacent to the site. The river itself also maintains several vital functions such as water

transportation, wetland and aquatic habitats and bio-remediation and it is therefore crucial that the development not affect this functioning. This should be doable as long as the development does not encroach into the riparian zone of 1:100 year floodline. The surrounding mining transformation contributes to the modification of the functioning of the site as habitat for fauna though the site itself does still support the natural vegetation type. Overall the ecological functioning of the site is considered moderately modified.

Degree of rarity/conservation value:

The natural vegetation types in the area, Highveld Alluvial Vegetation and Central Free State Grassland are both only listed as being of Least Concern and is therefore not of high conservation value.

According to the Free State Province Biodiversity Management Plan (2015) the site for the proposed solar development is listed as being an Ecological Support Areas 1 & 2 (ESA 1 & 2) This indicates that the area is not essential to meeting conservation targets but forms part of the functioning of the Doring River adjacent to the site and as a result does provide important functions in the support of this system.

From the above the site does not seem to have a high conservation value, however, it is clear that the Doring River provides vital services including water transportation, storm water, wetland and riparian habitats and groundwater recharge and therefore has a very high conservation value. As long as the development, refrains from encroaching into the 1:100 year floodline of the river it should not affect the conservation of it.

Overall the site is therefore considered as having a moderate conservation value.

Percentage ground cover:

The percentage vegetation cover on the site still largely natural though disturbances on and adjacent to the development area such as tailings and mining operations does influence the natural vegetation cover.

Vegetation structure:

The vegetation types in the area is characterised by grassland and thicket habitats both which are well represented on the site. However, a increased establishment of thicket, especially the *Vachellia karroo* trees are likely and therefore a moderate modification of the vegetation structure is considered likely.

Infestation with exotic weeds and invader plants:

The site contains a moderate establishment of exotic weeds which include *Bidens bipinnata*, *Tagetes minuta*, *Conyza bonariensis*, *Opuntia humifusa*, *Xanthium spinosum*, *Verbena bonariensis* and *Verbena tenuisecta*. Where degradation is evident, such as the tailings dump on the site, more invasive plants have also established such as *Melia azedarach*, *Tamarix chinensis* and *Cortaderia selloana*. These are also well known invasive and problematic plants.

Degree of grazing/browsing impact:

The area is being utilised as grazing for domestic livestock and significant levels of overgrazing and trampling were also noted. It is however still considered to remain at moderate levels.

Signs of erosion:

Signs of erosion is common, though are for the most part still regarded as natural. This includes natural gulley erosion within the floodplain of the Doring River. This natural erosion has however been moderately increased by the on-site impacts, notably trampling by domestic livestock.

Terrestrial animals:

Signs and tracks of mammals are present on the site but notably less when compared to the natural condition. This is most likely a consequence of the proximity of the mining operations and frequent human activities in the area. Being dominated by natural vegetation the site itself will therefore still have capacity for a natural mammal population though the actual mammal population will be smaller and dominated by generalist species. . Rare and endangered mammals are often reclusive and avoid areas in close proximity to human activities and are also dependant on habitat in pristine condition. Such species are therefore considered unlikely to occur in the area though the Doring River may still provide suitable habitat for Cape Clawless Otter (*Aonyx capensis*) though should remain largely unaffected by the development as long as the development footprint is kept outside the 1:100 year floodline of the river.

Wetland and riparian habitats also generally provide a higher abundance of resources and subsequently are also able to sustain a diverse and large mammal population (Appendix A: Map 3). This will also be the case for the Doring River adjacent to the site. It is therefore also important that this system not be affected by the development. As long as the development footprint is kept outside the 1:100 year floodline of the river, the impact on the mammal population along the river should remain low.

An ecology sensitivity map has been compiled using existing information for the province, as well as field survey results. This ecological sensitivity map is preliminary in nature and will be revised during in the EIA phase as required. The following preliminary sensitivities were identified:

The following preliminary ecological sensitivities have been identified:

- » High Ecological Sensitivity:
 - The floodplain
 - Stormwater section towards the north eastern area
- » Medium Ecological Sensitivity:
 - The natural riparian vegetation
- » Low Ecological Sensitivity:
 - The Ploughed fields located towards the southern part of the site; this area has been earmarked as preferred for development
 - Plantation and building area towards the most eastern part of the development area, this location was initially approved as the development footprint due to the low sensitivities but was later altered to avoid other sensitivities.

Issue	Nature of impact	Extent of impact	No-go areas
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Loss of vegetation and consequently habitat and species diversity as a result.	Solar PV developments usually entail the removal of surface vegetation and may also involve modification of the surface topography. This therefore has a large impact in terms of the loss of vegetation, vegetation type and consequently habitat.	National – Loss of vegetation and habitat may have an impact on meeting national conservation targets for specific habitats and vegetation types.	None Identified at this point of study
Loss of protected, rare or threatened plant species.	Portions of remaining natural grassland do still contain several protected plant species with significant conservation value. Development within these areas will entail the loss of protected species which will result in a fairly high impact.	National – The loss of any protected species will compromise the national status of the species and consequently the risk of extinction.	Areas of natural grassland
Impacts on watercourses, wetlands or the general catchment.	The survey of the site has identified two pan wetland systems in the north western portion of the site while the Doring River is also situated along the north eastern border of the site. Development within any of these wetland areas will result in a high impact.	Regional – Impacts on watercourses and wetlands may be propagated to downstream systems in which case the broader system will also be affected by the development.	Not Applicable.
The impact that the development will have on exotic weeds and invasive species, both current and anticipated conditions.	Disturbance caused by the development will result in the increased establishment of exotic and invasive plant species.	Regional – Increased establishment of weeds will form a dispersion node from where weeds will spread into the surrounding areas.	Not Applicable.
Any increased erosion that the development may cause.	Because solar PV developments result in the removal of vegetation, this reduces infiltration and promotes runoff. Coupled with the rain shadow caused by panels and the resulting dripline, this increases runoff and erosion.	Regional – Erosion induced by developments entails the unnatural removal of topsoil which results in high sediment loads in watercourses which when transported to downstream systems will also affect the broader system.	Not Applicable.
Fragmentation of habitat, disruption of ecological connectivity and -functioning in terms of the surrounding areas.	The area is extensively transformed by various land uses and is therefore greatly	National – Should the development encroach into any remaining natural areas this will have significant additional	Significant portions of the site still consist of Vaal-Vet Sandy Grassland. This

	affected by habitat fragmentation and the disruption of ecosystem processes (impacts in terms of habitat fragmentation.	vegetation type is listed as Endangered (EN)
Impacts that will result on the mammal population on and around the site.	The most significant impact on mammals anticipated on the site itself is primarily concerned with the loss and fragmentation of available habitat.	National – Should any populations of conservation concern be present on the site, the resulting development will reduce the overall population size which may then affect its national status.	Endangered Vaal-Vet Sandy Grassland habitat and CBA 1 areas.
Any significant cumulative impacts that the development will contribute towards..	The area has a long history of transformation by mining, agriculture and urban expansion and the cumulative impact that this has had is extensive (National – Should the proposed development further encroach into natural areas it will have a high cumulative impact.	Significant portions of the site still consist of Vaal-Vet Sandy Grassland. This vegetation type is listed as Endangered (EN)
Description of expected significance of impact			
Should development take place without mitigation it is anticipated that several moderate-high to high impacts will occur. The impact on remaining natural areas of grassland as well as the wetland systems in the north western portion of the site will especially be heavily affected. However, with the implementation of appropriate mitigation, these can all be reduced to moderate and low-moderate impacts. This is however subject to the development footprint being retained within areas of low sensitivity and avoiding any areas of remaining natural grassland as well as the wetland systems on the site			
Gaps in knowledge & recommendations for further study			
A detailed on-site survey has already conducted which results in a high degree of certainty. However, the following limitations may still affect the accuracy of the assessment:			
<ul style="list-style-type: none"> » Due to the season of the survey several bulbs, seasonal herbs and subterranean succulents may have been overlooked as leaves and flowers may be absent due to their seasonal or deciduous nature. » Although a comprehensive survey of the site was done it is still likely that several species were not observed in the field. » Smaller drainage lines may have been overlooked where a distinct channel or riparian vegetation is absent. » Due to previous transformation and mining activities this may have altered soil layers and the morphology of drainage areas which would complicate the delineation of wetland and riparian areas. » Some animal species may not have been observed as a result of their nocturnal and/or shy habits. 			

7.2.2 Impacts on avifauna

The potential impacts to avifauna from construction and/or operation activities include:

Displacement due to disturbance associated with the construction of the solar PV plant and associated infrastructure

- » As far as disturbance is concerned, it is likely that all the avifauna, including all the priority species (these are species that are of concern due to their population status and their sensitivity to habitat manipulation), will be temporarily displaced in the footprint area, either completely or more likely partially (reduced densities) during the construction phase, due to the disturbance associated with the construction activities e.g. increased vehicle traffic and short-term construction related noise (from equipment) and visual disturbance

Displacement due to habitat transformation associated with the construction of the solar PV plant and associated infrastructure

- » Ground-disturbing activities affect a variety of processes in arid areas, including soil density, water infiltration rate, vulnerability to erosion, secondary plant succession, invasion by exotic plant species, and stability of cryptobiotic soil crusts. These processes have the ability – individually and together – to alter habitat quality, often to the detriment of wildlife, including avifauna. Any disturbance and alteration to the desert landscape, including the construction and decommissioning of utility-scale solar energy facilities, has the potential to increase soil erosion. Erosion can physically and physiologically affect plant species and can thus adversely influence primary production and food availability for wildlife (Lovich & Ennen 2011).

Collisions with the solar panels

- » This impact refers to collision-related fatality during operation i.e., fatality resulting from the direct contact of the bird with a project structure(s). This type of fatality has been occasionally documented at solar projects of all technology types (McCrary et al. 1986; Hernandez et al. 2014; Kagan et al. 2014). In some instances, the bird is not killed outright by the collision impact, but succumbs to predation later, as it cannot avoid predators due to its injured state.

Entrapment in perimeter fences

- » Visser et al. (2018) recorded a fence-line fatality (Orange River Francolin *Scleroptila gutturalis*) resulting from the bird being trapped between the inner and outer perimeter fence of the facility. This was further supported by observations of large-bodied birds unable to escape from between the two fences (e.g. Red-crested Korhaan (*Lophotis ruficrista*) (Visser et al. 2019). Considering that one would expect the birds to be able to take off in the lengthwise direction (parallel to the fences), it seems possible that the birds panicked when they were approached by observers and thus flew into the fence.

Electrocution of priority species on the internal medium voltage reticulation network

- » Medium voltage electricity poles could potentially pose an electrocution risk to raptors. Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2000). The electrocution risk is largely determined by the design of the electrical hardware.

Collision with the internal medium voltage power lines

Collisions are the biggest threat posed by transmission lines to birds in southern Africa (Van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds, and to a lesser extent, vultures. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines (Van Rooyen 2004, Anderson 2001).

Sensitivity Analysis of the Site

The following preliminary avifauna sensitivities have been identified:

» Areas of high sensitivity

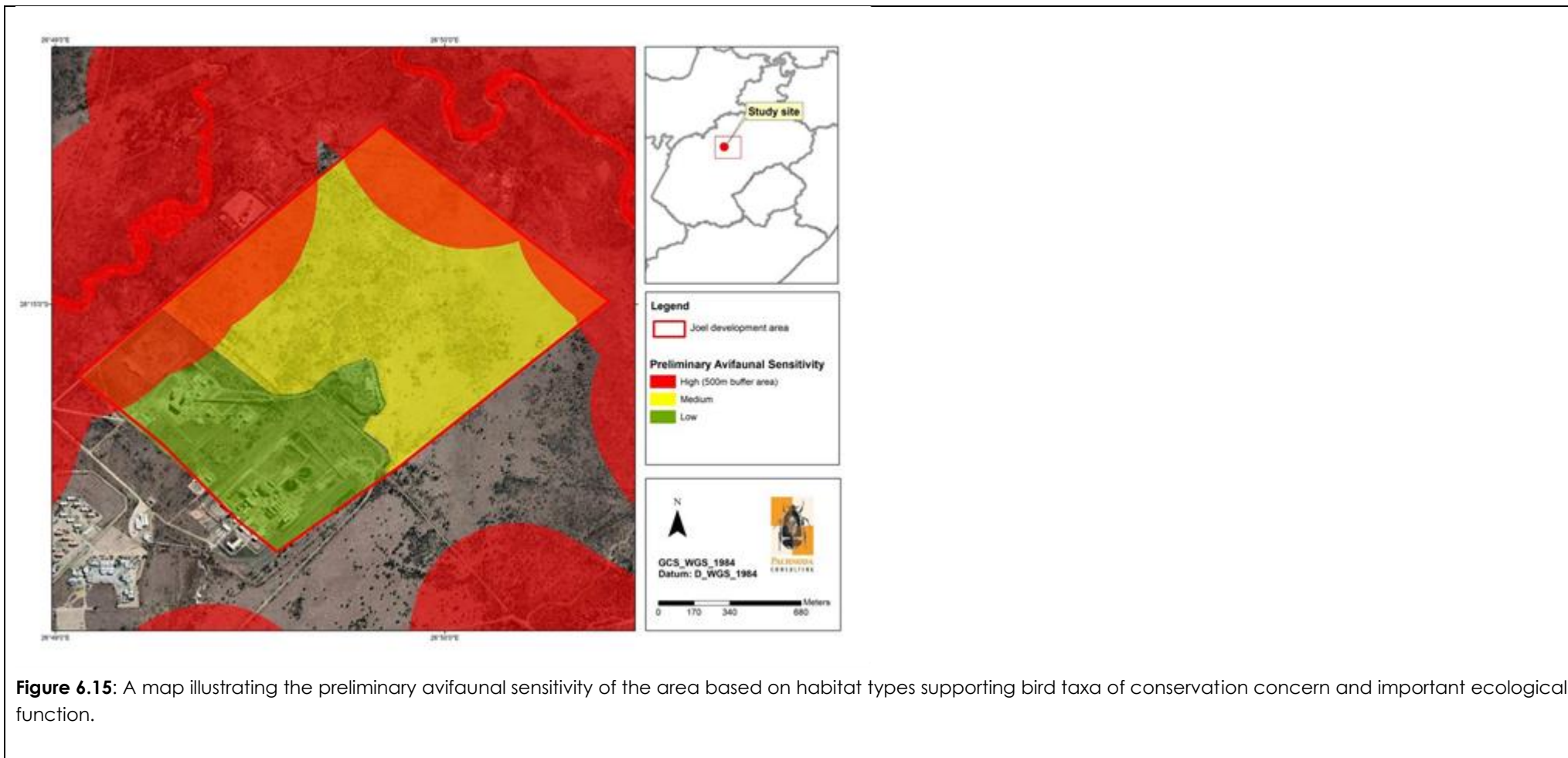
- Sensitive ecosystems with either low inherent resistance or low resilience towards disturbance factors or highly dynamic systems considered important for the maintenance of ecosystem integrity. Most of these systems represent ecosystems with high connectivity with other important ecological systems OR with high species diversity and usually provide suitable habitat for a number of threatened or rare species. These areas should preferably be protected;
- include the nearby Doring River and its tributaries and the proposed buffer zones (500m).
- The Doring River system provides foraging habitat for a number of waterbird taxa (mainly waterfowl of the genera *Anas*, *Alopochen*, *Tadorna* and *Plectropterus*), of which these taxa may collide with the proposed PV panels and infrastructure when dispersing (especially when dispersing towards nearby impoundments, dams and inundated wetland features). More importantly, the linear configuration of the Doring River and its associated tributaries are important flyways for waterbird taxa in the region, and should preferably be buffered by at least 500m to avoid or minimise the risk of these bird interacting with the proposed PV infrastructure.

» Areas of medium sensitivity

- These are slightly modified systems which occur along gradients of disturbances of low-medium intensity with some degree of connectivity with other ecological systems OR ecosystems with intermediate levels of species diversity but may include potential ephemeral habitat for threatened species;
- Areas of medium sensitivity represent habitat units of open savannoid grassland and bush clump mosaics. These habitat types provide ephemeral foraging habitat for certain threatened bird species (e.g. Secretarybird), as well as terrestrial bird species (e.g. Northern Black Korhaan) with the potential to interact (e.g. collide) with the proposed electrical infrastructure. However, reporting rates for threatened bird species was relatively low, thereby suggesting a medium sensitivity rating instead of a high sensitivity even though the majority of the habitat units is natural.

» Areas of low sensitivity

- Degraded and highly disturbed/transformed systems with little ecological function and are generally very poor in species diversity (most species are usually exotic or weeds).
- *Areas of low sensitivity include habitat units represented by transformed types and mining infrastructure, thereby contributing little towards local biodiversity.*



Issue	Nature of Impact	Extent of Impact	No-Go Areas
Loss of intact habitat and subsequent displacement of bird species due to the footprint required for transformation for the facility and associated infrastructure.	Vegetation clearing will potentially lead to the loss of avifaunal species, habitats and ecosystems as birds are displaced from their habitat.	Local	None identified at this stage

	Losses of natural habitat and displacement of birds through physical transformation, modifications, removals and land clearance. This impact is mainly restricted to the construction phase and is permanent		
Mortality of avifauna from collisions with PV facility during the operational phase (collision with the PV panels).	Mortality among the local avifauna may result due to direct collisions with solar panels, making use the facility infrastructure for nesting sites, or entrapment along the fenced boundaries of the facility. The impact is Negative, especially for waterbirds and shorebird taxa	Local	Potentially the southern part of the study area where a high frequency of passing birds is expected on a daily basis.
Mortality of avifauna from collisions with plant infrastructure including power lines	Mortality among the local avifauna may result due to direct collisions with power line. Negative, especially for large-bodied species and potentially also storks and flamingo taxa	Local	Potentially the southern part of the study area where a high frequency of passing birds is expected on a daily basis.
<p>Description of expected significance of impact</p> <p>The impacts will be of a long duration (prior to mitigation). The impact is expected to have a low significance after proposed mitigation suggestions and if the sensitivity map is considered due to the current poor ecological condition of most of the terrestrial habitat types.</p> <p>Impacts restricted to the construction period, such as noise, are likely to be of low significance. With mitigation, the impact of the facility during operation on avifauna due to nesting, collision and other interaction is expected to be of low significance.</p>			
<p>Gaps in knowledge & recommendations for further study</p> <ul style="list-style-type: none"> » A wet season survey is proposed to determine occurrence of waterbird species. A baseline survey determine relative bird densities and distribution ranges. » The density and distribution of protected species of conservation concern across the project site will need to be characterised and quantified within the proposed development footprint to better inform the EIA Phase and the final sensitivity map. » The design and position of the development footprint and facility should consider potential impacts on avifauna. 			

7.2.4. Impacts on Soils, Geology, Agricultural Potential

Potential impacts on soil

The anticipated impacts of the proposed project on soil are soil compaction, erosion, soil pollution and the loss of soil fertility from the topsoil horizons to be stripped and stockpiled during the construction phase. Below follows a description of the impacts anticipated:

The most significant impact will most likely be caused by the traversing of vehicles over the terrain during the construction phase. This will result in soil compaction. Soil compaction affects the infiltration of rain into the soil and will increase the risk of erosion as a result of this. Deep level soil compaction (as caused by heavy vehicle traffic) is difficult to alleviate.

- » Loss of areas where livestock can be produced
- » Soil compaction due to construction vehicles traversing on site.
- » Soil erosion due to alteration of the land surface run-off characteristics. Alteration of run-off characteristics may be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard standing surfaces and roads. Erosion will cause loss and deterioration of soil resources.
- » Loss of soil fertility through disturbance of in situ horizon organisation.
- » Soil chemical pollution due to oils and fuel spillages on site

Sensitivity Analysis of the Site

An land capability sensitivity map has been compiled using existing information and no areas of high sensitivity have been identified at this stage (**Figure 7.xx**). This sensitivity map is preliminary in nature and will be revised during in the EIA phase as required.

The following preliminary soil an agricultural sensitivity has been identified:

No sensitivity higher than Medium has been identified for the proposed development

- » Medium Agricultural Sensitivity:
 - Various different soil types such as Bonheim, Valsrivier, and Swartland have been identified on site.

No crop cultivation has taken place within the development area. The soil and agricultural sensitivity of the site therefore varies between low and moderate, depending on the soil properties, topography and other landscape features of the development area.

No no-go areas have been identified for the proposed project from the perspective of soil and agricultural resource conservation.

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Issue	Nature of Impact	Extent of Impact	No-Go Areas
Loss of areas where livestock can be grazed	Areas where the PV modules and other infrastructure will be constructed, will no longer be available for livestock production. Project will result in the possible loss of grazing areas for the local community's livestock that may reduce the income generated from livestock sales.	Local	None identified at this stage
Change in the land capability of the site	Where soil is disturbed by construction activities, the land capability may be altered	Local	None identified at this stage
Soil compaction	Soil compaction will occur wherever construction vehicles and equipment will traverse the site and where the PV modules and other long-term infrastructure will be erected. Soil compaction reduces the water infiltration rate of soil that increase the risk of run-off	Local	None identified at this stage
Soil erosion	Bare soil surfaces are prone to loss of soil particles as a result of wind and water movement. Alteration of run-off characteristics may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.	Local	None identified at this stage
Loss of soil fertility through disturbance of soil organisation	Earthworks as part of construction of the Solar Energy Facility will result in disturbance of soil	Local	None identified at this stage
Soil chemical pollution	Oil and fuel spillages as well as waste generation during the project cycle will result in soil chemical pollution	Local	None identified at this stage
Description of expected significance of impact			
The significance of agricultural impacts is influenced by the limited agricultural capability of the site, with no cultivation practises, and that the footprint of disturbance will only impact on a portion of the total land surface. The agricultural potential of the broader area will not be affected by the proposed project. It is not anticipated that the inherent agricultural potential of the site will be changed permanently by the project. The proposed project may have a moderate impact on the current land use.			
Gaps in knowledge & recommendations for further study			
The appropriate placement of the PV facility and other infrastructure to be assessed considering the slopes and erodibility of the soils present on the site. The following will be assessed in the EIA phase: » Soil conditions/classification			

- » Erosion potential and mitigation
- » Activities and materials that may result in soil pollution
- » Current land use viability

Soil samples that will be taken during the site visit will be analysed to determine whether the soil physical properties of the site are particularly sensitive to soil compaction.

7.2.5. Impacts on Heritage (Archaeology and Palaeontology)

Archaeology

All archaeological finds at Joel were documented in what appear to be ex-situ surface contexts. However, the absence of evidence for trampling of artefacts, particularly at JL5, suggests that post-depositional effects on surface stone scatters may be marginal, and artefacts may have been exposed relatively recently. Further, the presence of artefacts that are currently eroding out of quaternary sediments at JL5 suggests that there may be sub-surface archaeological occurrences within the footprint. The potential for finding a preserved and dateable in-situ archaeological horizon based on surface observations and based on the availability of current dating techniques (luminescence would be the only set of applicable methods to this context), however, is low based on the absence of dateable organic materials and the bioturbated nature of sediments partially encompassing some of the artefacts (JL5). This site is graded IIIB for its potential to contribute to the body of scientific knowledge.

Based on the surface observations outlined above, the presence of sub-surface contextualised materials at Joel cannot be excluded as a possibility. Excavation associated with the development should therefore be aware of the potential for sub-surface Stone Age materials. As such, it is recommended that a no-development area of 50m is implemented around site JL5 .

JL2 represents a site that accumulated because of the chert raw-material source nearby, so flakes are largely primary. JL2 also has a hammerstone with visible pitting associated with percussion activities – probably knapping. This site has been graded IIIC and it is recommended that a no-development area of 30m is implemented around this site to ensure that it is conserved.

The documented archaeology at Joel is classified as scientifically LOW SIGNIFICANCE apart from the site at JL5 which is classified as MODERATE SIGNIFICANCE.

Concerning the Stone Age archaeology at Joel, there are no objections to the authorization of the proposed development, provided that the monitoring recommendations outlined above are adhered to, and provided that if any evidence of human remains are exposed during excavation, that development activities cease in the area of the identified remains.

Palaeontology

According to the Desktop Palaeontology Assessment, "Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the sandstones, shales and sands are typical for the country and might contain trapped fossils. The sands of the Quaternary period would not preserve fossils.

The area has been disturbed from farming and mining so no fossils would be present on the surface. No vertebrates or plants have been recorded so the lithology and assemblage zone can only be extrapolated."

"Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the right age to contain fossils but are covered by soils. Furthermore, the material to be excavated are soils and this does not preserve fossils. Since there is a small chance that vertebrate fossils typical of the Daptocephalus Assemblage Zone or plant or bone fragments were trapped in pans that might occur below the soils and may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is low."

"Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying sands and soils of the Quaternary. There is a very small chance that fossils may occur in pans or springs but no such feature is visible in the satellite imagery. Vertebrate fossils may occur but there is no outcrop. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr."

Sensitivity Analysis of the Site

A heritage sensitivity map has been compiled using existing information and no areas of high sensitivity have been identified at this stage. This sensitivity map is preliminary in nature and will be revised during in the EIA phase as required.

- » No-Go Area:
 - The 30m buffer area recommended around site JL2 is implemented
 - The 50m buffer area recommended around site JL5 is implemented
- » Low Sensitivity
 - All transformed and disturbed areas:

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Destruction of archaeological heritage	Impact to significant archaeological resources such as Stone Age artefact scatters, remnants of Iron Age settlements, burial grounds and graves, historical artefacts, historical structures and rock art engravings through destruction during the development phase and disturbance during the operational phase is possible.	Local	A no-impact buffer of 30m is implemented around Site JL2 and a 50m buffer around site JL5
Negative impact to significant cultural landscapes	There is the potential for the proposed solar energy facility to negatively impact the cultural landscape due to a change in the landscape character from rural and mining to semi-industrial, however, due to the density of mining activities in the area, the impact on the experience of the cultural landscape is not foreseen to be significant.	Regional	None identified at this stage

Destruction of palaeontological heritage	Impacts to palaeontological resources are unlikely.	Local	None identified at this stage
<p>Description of expected significance of impact</p> <p>» Field assessment will determine the significance of the resources likely to be impacted. Impacts can be minimised through the implementation of appropriate mitigation measures.</p>			

<p>Gaps in knowledge & recommendations for further study</p> <p>» The project area and the area more broadly have not been subjected to many heritage impact assessments and therefore substantial gaps in knowledge exist. Field assessment will fill these gaps.</p> <p>Recommendations with regards to general field surveys</p> <p>» Archaeological field surveys must provide sufficient ground-coverage of the areas to be developed to be able to determine the nature of the resources likely to be impacted.</p> <p>» Palaeontological and cultural landscape field surveys will target sensitive geological and cultural landscape features.</p>
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7.2.6. Social Impacts

Members from the local communities in the area, specifically Rustenburg and the adjacent residential areas, would be in a position to qualify for most of the low skilled and semi-skilled employment opportunities. Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members of the community. Based on information from similar projects the total wage bill will be in the region of R 25 million (2021 Rand values). A percentage of the wage bill will be spent in the local economy which will also create opportunities for local businesses in the local towns in the area.

Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The capital expenditure associated with the construction phase will be approximately R 1 billion (2022 Rand value). Given the well-developed mining sector the potential for local companies (engineering, civils etc.) in the RLM to benefit from the project is high. The local service sector will also benefit from the construction phase. The potential opportunities would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site.

The hospitality industry in the area will also benefit from the provision of accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives etc.) and other (non-construction) personnel involved on the project. Experience from other construction projects indicates that the potential opportunities are not limited to on-site construction workers but also to consultants and product representatives associated with the project.

The positive and negative social impacts identified and assessed for the construction phase includes:

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

Impact: Creation of direct and indirect employment opportunities and skills development

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Construction of the project will result in the creation of a number of direct and indirect employment opportunities, which will assist in addressing unemployment levels within the area and aid in skills development of communities in the area.	Positive – the creation of employment opportunities will assist to an extent in alleviating unemployment levels within the area.	The impact will occur at a local, regional and national level.	None identified at this stage

Description of expected significance of impact

At its peak, the construction is likely to result in the creation of approximately 100 – 120 employment opportunities. Of those employment opportunities available, approximately 60% will comprise opportunities for low skilled workers, 25% for semi-skilled workers, and 15% for skilled workers. Skills developed through experience in the construction of the facility will be retained by the community members involved. The impact is likely to be positive, local to national in extent, short-term, and of medium significance

Gaps in knowledge & recommendations for further study

- » Collection on exact direct and indirect employment opportunities and skills development opportunities.
- » Collection of information on local municipality and services sector

Recommendations with regards to general field surveys

- » Site visits and interviews with representatives from local municipality, and mining sector.
- » Site visit and interviews with local farmers and local community

7.2.7. Visual Impact

Existing Settlements and Infrastructure

Anticipated issues related to the potential visual impact of the proposed PV facility include the following:

- » The visibility of the facility to, and potential visual impact on, observers travelling along the secondary road (unnamed road) in closer proximity to the proposed infrastructure.
- » The visibility of the facility to, and potential visual impact on residents of dwellings within the study area, with specific reference to the farm residence in closer proximity to the proposed development.
- » The potential visual impact of the facility on the visual character or sense of place of the region.
- » The potential visual impact of the facility on tourist routes or tourist destinations / facilities (if present).
- » The potential visual impact of the construction of ancillary infrastructure (i.e., internal access roads, buildings, power line, etc.) on observers in close proximity to the facility.
- » The visual absorption capacity of the natural vegetation (if applicable) or built structures / mining infrastructure.
- » Potential cumulative visual impacts (or consolidation of visual impacts), with specific reference to the placement of the PV facility within a predominantly mining area.
- » The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility.
- » Potential visual impact of solar glint and glare as a visual distraction and possible air / road travel hazard.
- » Potential visual impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity to the PV facility.
- » Potential visual impacts associated with the construction phase.
- » The potential to mitigate visual impacts and inform the design process.

It is envisaged that the issues listed above may potentially constitute a visual impact at a local and / or regional scale. These need to be assessed in greater detail during the EIA phase of the project.

Sensitivity Analysis of the Site

The result of the viewshed analysis for the proposed facility is shown on **Figure 7.8**. The viewshed analysis was undertaken from a number of vantage points within the development footprint at an offset of 6m above ground level. This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures associated with the facility.

The viewshed analysis will be further refined once a facility layout is completed and will be regenerated for the actual position of the infrastructure on the site and actual proposed infrastructure during the EIA phase of the project.

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

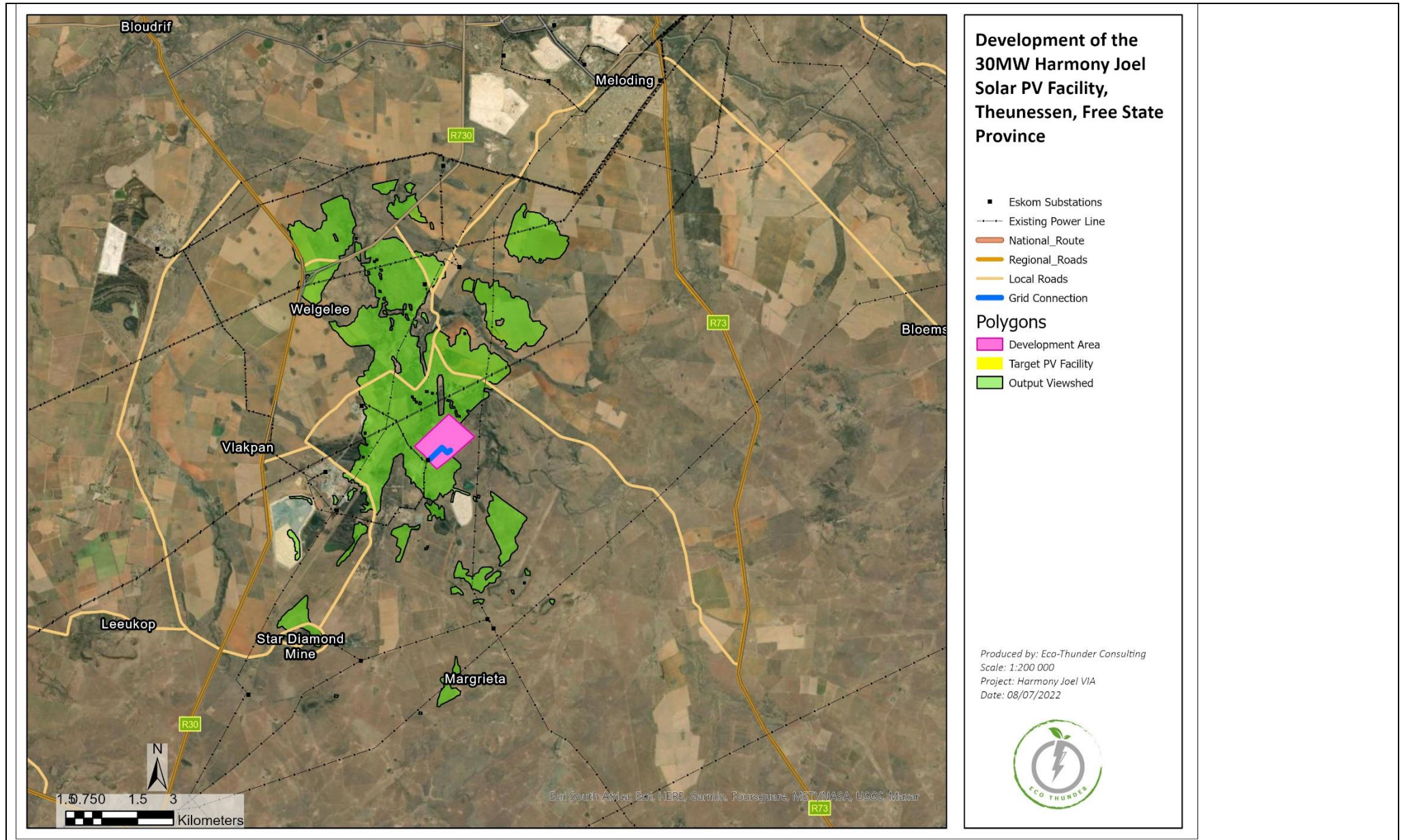


Figure 7.8: Viewshed analysis of the proposed area			
<p>Impact Visual impact of the facility on observers in close proximity to the proposed PV facility infrastructure and activities. Potential sensitive visual receptors include:</p> <ul style="list-style-type: none"> » Residents of homesteads and farm dwellings (in closer proximity to the facility) » Observers travelling along the secondary roads traversing near the proposed development 			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
The viewing of the PV facility infrastructure and activities	The potential negative experience of viewing the infrastructure and activities	Local - Primarily observers situated within a 1km (and potentially up to 3km) radius of the facility	None identified at this stage
<p>Description of expected significance of impact Due to the nature and location of the facility, there is likely to be a long-term influence on surrounding landscape character as experienced by the receptors. The impact would be local in extent and probable. The significance is therefore anticipated to be medium. The significance of this impact will be confirmed during the EIA Phase.</p>			
<p>Gaps in knowledge & recommendations for further study A finalised layout of the PV facility and ancillary infrastructure are required for further analysis. This includes the provision of the dimensions of the proposed structures and ancillary equipment. Additional spatial analyses are required in order to create a visual impact index that will include the following criteria:</p> <ul style="list-style-type: none"> » Visual exposure » Visual distance / observer proximity to the structures / activities » Viewer incidence / viewer perception (sensitive visual receptors) » Visual absorption capacity of the environment surrounding the infrastructure and activities <p>Additional activities:</p> <ul style="list-style-type: none"> » Identify potential cumulative visual impacts » Undertake a site visit » Recommend mitigation measures and / or infrastructure placement alternatives 			

7.3 Evaluation of Potential Cumulative Impacts Associated with the project

Impacts of a cumulative nature place the direct and indirect impacts of the proposed project into a regional and national context, particularly in view of similar or resultant developments and activities in the region. Potential cumulative impacts associated with the Harmony Joel Solar PV facility are described below and will be assessed in detail as part of the EIA phase to be conducted for the project.

Impact

Cumulative impacts, in relation to an activity, refer to the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004). It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by solar PV facility developments throughout South Africa, while the significance of the cumulative impact on the visual amenity may only be influenced by solar PV facility developments that are in closer proximity to each other. For practical purposes a sub-regional scale of 30km is considered for the evaluation of cumulative impact of PV facilities.

The cumulative impacts associated with Harmony Joel Solar PV Facility has been viewed from two perspectives within this Scoping Report:

- » Cumulative impacts associated with the scale of the project (one 18MW PV Facility on the project site); and
- » Cumulative impacts associated with other relevant planned, approved or existing solar developments within a 30km radius of the project site (multiple PV facilities in the proximity of the site).

Cumulative effects are commonly understood as the impacts which combine from different projects, and which result in significant change, which is larger than the sum of all the impacts (DEAT, 2004). The complicating factor is that the projects that need to be considered are from past, present, and reasonably foreseeable future development. Cumulative effects can be characterised according to the pathway they follow. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are:

- » Additive (incremental);
- » Interactive.
- » Sequential; or
- » Synergistic.

Canter and Sadler (1997) describe the following process for addressing cumulative effects in an EIA:

- » Delineating potential sources of cumulative change (i.e. GIS to map the relevant renewable energy facilities in close proximity to one another);
- » Identifying the pathways of possible change (direct impacts);
- » Indirect, non-linear or synergistic processes; and

- » Classification of resultant cumulative changes.

The site for the proposed development is located within 30km from several other authorised solar PV facilities. These projects include the following (refer to **Figure 8.8**):

Project Name	Project Status
Beatrix Mine PV	Environmental Authorization
Farm Onverwag PV	Environmental Authorization
Beatrix Mine PV	Environmental Authorization
Sonvanger PV	Environmental Authorization

The cumulative impacts that have the potential to be compounded through the development of the solar PV facility and its associated infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to test if such impacts are relevant to the Harmony Joel Solar PV facility within the development area being considered for the development:

- » Unacceptable loss of threatened or protected vegetation types, habitat or species through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning.
- » Unacceptable risk to 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 PV panels.
- » 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);
- » Unacceptable impact to social factors and components.

Summary of the nature, significance, consequence, extent, duration and probability of the impacts

- » The above-mentioned impacts are considered to be probable, although it is anticipated that the extent, duration, and magnitude of these impacts can be minimised to levels where this impact can be regarded as having low significance through the implementation of appropriate mitigation measures.
- » The operational lifespan of the project and other solar energy facilities within the surrounding areas is expected to be long-term (i.e. a minimum of 20 years) and subsequently the impact is also expected to be long-term.
 - » The impact associated with the proposed development is expected to be local, affecting mainly the immediate environment and surrounding areas, as well as other renewable energy facilities within the vicinity.

Gaps in knowledge & recommendations for further study:

- » Each specialist study will consider and assess the cumulative impacts of proposed, approved and authorised renewable projects in the area.
- » Cumulative impacts will be fully assessed and considered in the EIA phase.

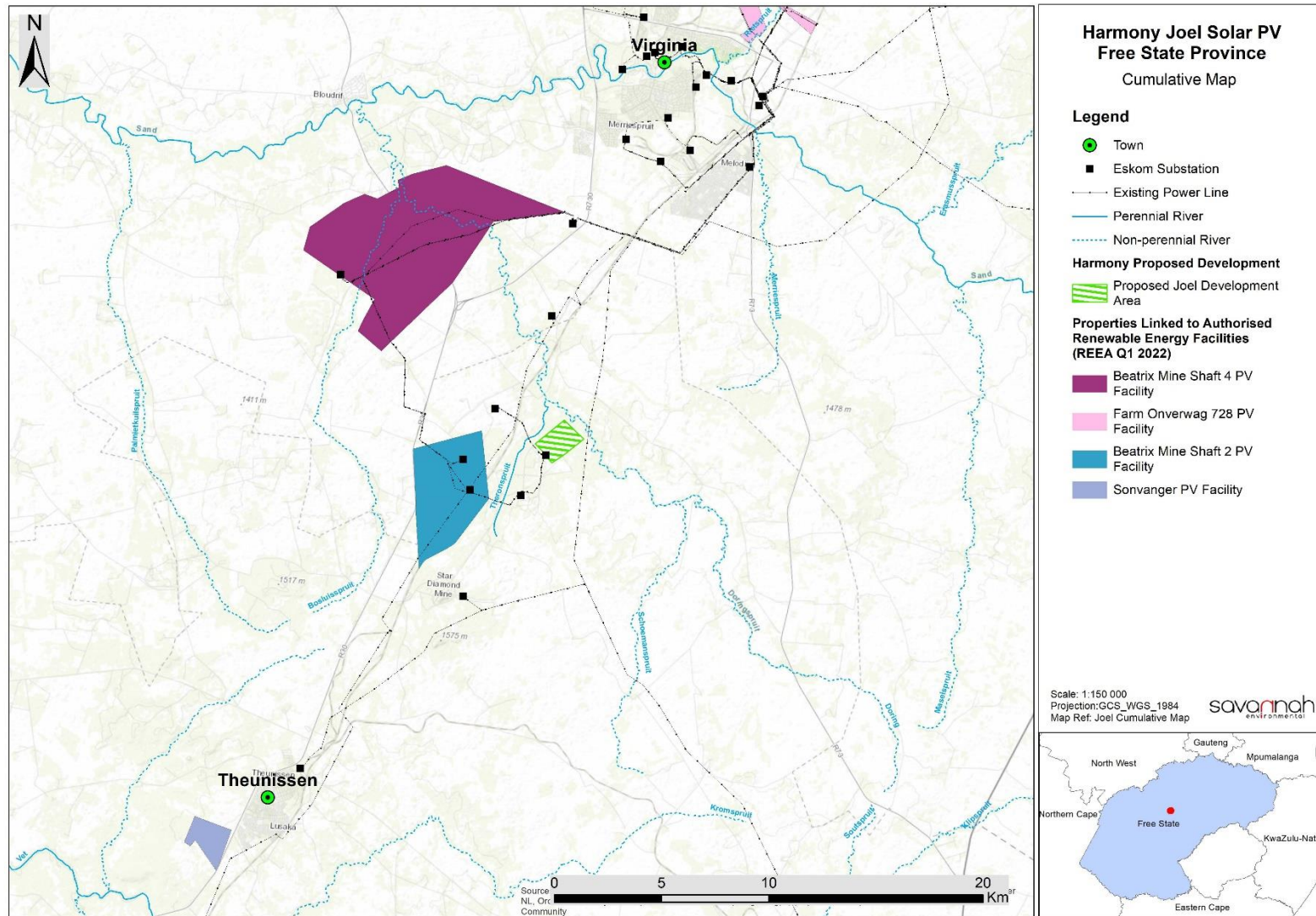


Figure 7.9: Cumulative map illustrating other approved and/or constructed PV facilities located within the vicinity of the Harmony Joel Solar PV Facility project site (**Appendix I**).

CHAPTER 8: CONCLUSIONS

This Scoping Report is aimed at detailing the nature and extent of the proposed development, identifying and describing potential issues associated with developing the Harmony Joel Solar PV Facility and associated infrastructure on the identified site, potential environmental fatal flaws and / or areas of sensitivity, and defining the extent of studies required to be undertaken as part of the detailed EIA phase. This was achieved through an evaluation of the proposed project, involving the project proponent, and specialist consultants. This Scoping Report has been compiled in terms of the 2014 EIA Regulations (GNR 326) published in terms of Section 24(5) of NEMA.

A summary of the conclusions of the evaluation of the potential impacts identified to be associated with the project is provided in **Section 8.2**. Recommendations regarding investigations required to be undertaken within the detailed EIA phase are provided within the Plan of Study for EIA (**Chapter 9**).

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

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
2(g)(xi) a concluding statement indicating the preferred alternatives, including the preferred location of the activity.	An overall conclusion and fatal flaw analysis regarding the Harmony Joel Solar PV Facility is included within Section 8.4 .

8.2 Conclusions drawn from the Evaluation of the PV Facility Development

This Scoping Report documents the procedure for determining the extent of, and approach to, the Environmental Impact Assessment (EIA) Phase. The Scoping Phase included the following key tasks:

- » Involvement of relevant authorities and Interested and Affected Parties (I&APs) through the Public Involvement Process.
- » Consideration of feasible alternatives to be assessed during the EIA Phase.
- » Identification of potential impacts (positive and negative) associated with feasible project alternatives to be assessed during the EIA Phase.
- » Defining Terms of Reference for any specialist studies required to inform the EIA Phase (Plan of Study (PoS) for the Environmental Impact Assessment Report.

The project site is located north-east of the Harmony Joel operations, approximately ~20km north-east of the town of Theunissen within the Masilonyana Local Municipality and within the Lejweleputswa District Municipality, Free State Province.

The PV facility is located on Portion 0 of the Farm Leeuwbult 580 which is owned by the Mine but outside of the mining area (the project would not impact on mining activities).

A technically feasible project site, with an extent of 1000ha has been identified by Freegold Harmony (Pty) Ltd as a technically suitable area for the development of the Project. A development area of ~220ha was

demarcated within this project site and allows an adequate footprint for the installation of a solar PV facility with a contracted capacity of up to 18MW, while allowing for the avoidance of environmental site sensitivities. The size of the development footprint within the development area will be confirmed in the EIA Phase once the facility layout is available for assessment.

The development footprint will contain the following infrastructure to enable the Solar PV Facility to generate up to 18MW:

- » PV modules and mounting structures
- » Inverters and transformers a SCADA room, and maintenance room
- » Cabling between the project components, to be laid underground where practical
- » Access roads, internal roads and fencing around the development area.
- » Temporary and permanent laydown areas and O&M buildings.
- » Grid connection solution which will tie-in to Shafts 1 & 2 HJ Joel Mining Substation (located ~850m south west of the project site) via a 1.2km power line

The Scoping study included the identification of potential impacts associated with the project through specialist inputs and consultation with affected parties and key stakeholders. A preliminary evaluation of the extent and expected significance of potential impacts associated with the development of the Harmony Joel Solar PV Facility have been detailed in Chapter 7. These will be assessed in detail through the EIA Phase assessment, which will include independent specialist assessments.

This scoping study has identified areas of high environmental sensitivity within the development area and grid connection corridor to assist in focussing the location of the development footprint for the Harmony Joel Solar PV Facility in order to minimise the potential for environmental impact. The extent of the project site for the PV facility is ~680ha. A development area of ~310ha was demarcated within this project site and allows an adequate footprint for the installation of a solar PV facility with a contracted capacity of up to 18MW, while allowing for the avoidance of environmental site sensitivities. The size of the development footprint¹⁴ within the development area will be confirmed in the EIA phase once the facility layout is available for assessment.

The majority of potential impacts identified to be associated with the construction of the Harmony Joel Solar PV Facility is anticipated to be local and restricted to the development area itself, while operation phase impacts/benefits range from local to regional. No environmental fatal flaws were identified to be associated with the development area. The identified areas or features of high sensitivity to be avoided by the development footprint have been demarcated.

The potentially significant issues related to the **construction** of the Harmony Joel Solar PV Facility include:

- » Biodiversity and habitat loss and impacts on flora, fauna and avifauna resulting from activities such as site clearance for installation of the facility components and associated infrastructure.
- » Soil erosion, loss or degradation due to site clearance and compaction for installation of the facility components and associated infrastructure and due to the construction on internal access roads.
- » Impact on heritage and paleontological resources through construction activities.

¹⁴ the defined area (located within the development area) where the PV panel array and other associated infrastructure for Harmony Joel Solar PV is planned to be constructed. The Harmony Joel Solar PV development footprint will be defined during the EIA phase.

- » Visual impacts on the landscape.
- » Social impacts, both positive and negative (job creation and business opportunities, impacts associated with construction workers in the area).

The potentially significant issues related to the **operation** of the Harmony Joel Solar PV Facility include:

- » Change in land use to energy generation.
- » Habitat loss due to spread of alien vegetation
- » Visual impacts.
- » Positive social and economic impacts through job creation and economic benefits.

8.3 Sensitivity Analysis for the Development Area and Grid Connection Corridor

This section considers the sensitive features located within the development area, as identified by the independent specialists, and also indicates the locations of the sensitive features within the development area.

The potentially sensitive areas which have been identified through the scoping study are listed below and illustrated in **Figure 8.1**. The detail is based on the desktop review of available baseline information for the project site, as well as the sensitivity data from specialist studies undertaken during the scoping phase, which included limited field surveys. During the site and desktop surveys, the affected area was investigated in sufficient detail in order to provide definitive insight into the potential for constraining factors on the site. The sensitivity map must be used as a tool by the developer to avoid any areas flagged to be of higher risk or sensitivity and inform the location/layout of the development footprint for the facility and associated infrastructure. The development footprint is the area which will be assessed further in detail in the EIA Phase, in order to provide an assessment of environmental acceptability and suitability of the facility layout of the Harmony Joel Solar PV Facility .

8.3.1 Ecological and Freshwater Sensitive Features

Signs and tracks of mammals are present on the site but notably less when compared to the natural condition. This is most likely a consequence of the proximity of the mining operations and frequent human activities in the area. Being dominated by natural vegetation the site itself will therefore still have capacity for a natural mammal population though the actual mammal population will be smaller and dominated by generalist species. . Rare and endangered mammals are often reclusive and avoid areas in close proximity to human activities and are also dependant on habitat in pristine condition. Such species are therefore considered unlikely to occur in the area though the Doring River may still provide suitable habitat for Cape Clawless Otter (*Aonyx capensis*) though should remain largely unaffected by the development as long as the development footprint is kept outside the 1:100 year floodline of the river.

Wetland and riparian habitats also generally provide a higher abundance of resources and subsequently are also able to sustain a diverse and large mammal population (Appendix A: Map 3). This will also be the case for the Doring River adjacent to the site. It is therefore also important that this system not be affected by the development. As long as the development footprint is kept outside the 1:100 year floodline of the river, the impact on the mammal population along the river should remain low.

The mammal survey of the site was conducted by means of active searching and recording any tracks or signs of mammals and actual observations of mammals. From the survey the following actual observations of mammals were recorded:

- » Soil mounds of the Common Molerat (*Cryptomys hottentotus*) were common in most areas of the study area. This is a widespread species which has even become adapted to urban areas. It is a generalist species anticipated to occur in this area.
- » Scat and burrows of Yellow Mongoose (*Cynictis penicillata*) occur in the study area. This species is widespread and common and found in most natural or disturbed habitats.

Several burrows of small mammals were noted which could not be identified but do indicate a significant mammal population in the area.

- » Observation of a Steenbok (*Raphicerus campestris*). This species is widespread but confined to fairly natural or agricultural areas and generally avoid urban areas.
- » An active burrow of Aardvark (*Orycteropus afer*) occurs in the study area. This is also a fairly widespread and common species but is highly reclusive and is also listed as a protected species and is therefore of significant conservation value.

These species identified on the site indicate only a moderate species diversity of largely widespread and generalist species and is indicative of a modified natural mammal population. A similar mammal population should also be able to re-establish in the solar development footprint after construction has taken place.

The most significant impact on mammals anticipated on the site itself is primarily concerned with the loss and fragmentation of available habitat. Transformation of the natural vegetation on the site will result in a decrease in the population size as available habitat decreases. As indicated, the site does still consist of natural vegetation though it is still fairly uniform and with moderate habitat diversity and consequently the mammal population is also not anticipated to be diverse. The impact on the loss of habitat would therefore be significant but is unlikely exceed high values. In addition, extensive natural areas still remain in the surroundings into which mammals on the site move to without resulting in high habitat pressures.

It is also considered likely that several mammal species were overlooked during the survey and it may also be likely that other rare and endangered species may be present on the site.

8.3.2 Avifauna Sensitive Features

Three avifaunal habitat types were identified on the study site and surroundings, ranging from open savannoid grassland with bush clump mosaics, the Doring river and associated tributaries transformed areas. A total of 158 bird species have been recorded within the study area, including four Red listed species (threatened and near threatened species).

In addition, a total of 41 collision-prone bird species have been recorded from the study area (sensu atlas data), of which 28 species were waterbird and shorebird taxa and another seven species were birds of prey. However, the respective habitat types also provided habitat for at least 30 % of the regional near-endemic bird composition.

The following preliminary avifauna sensitivities have been identified:

- » Areas of high sensitivity
 - Sensitive ecosystems with either low inherent resistance or low resilience towards disturbance factors or highly dynamic systems considered important for the maintenance of ecosystem integrity. Most of these systems represent ecosystems with high connectivity with other important ecological systems OR with high species diversity and usually provide suitable habitat for a number of threatened or rare species. These areas should preferably be protected;
 - include the nearby Doring River and its tributaries and the proposed buffer zones (500m).
 - The Doring River system provides foraging habitat for a number of waterbird taxa (mainly waterfowl of the genera *Anas*, *Alopochen*, *Tadorna* and *Plectropterus*), of which these taxa may collide with the proposed PV panels and infrastructure when dispersing (especially when dispersing towards nearby impoundments, dams and inundated wetland features). More importantly, the linear configuration of the Doring River and its associated tributaries are important flyways for waterbird taxa in the region, and should preferably be buffered by at least 500m to avoid or minimise the risk of these bird interacting with the proposed PV infrastructure.
- » Areas of medium sensitivity
 - These are slightly modified systems which occur along gradients of disturbances of low-medium intensity with some degree of connectivity with other ecological systems OR ecosystems with intermediate levels of species diversity but may include potential ephemeral habitat for threatened species;
 - Areas of medium sensitivity represent habitat units of open savannoid grassland and bush clump mosaics. These habitat types provide ephemeral foraging habitat for certain threatened bird species (e.g. Secretarybird), as well as terrestrial bird species (e.g. Northern Black Korhaan) with the potential to interact (e.g. collide) with the proposed electrical infrastructure. However, reporting rates for threatened bird species was relatively low, thereby suggesting a medium sensitivity rating instead of a high sensitivity even though the majority of the habitat units is natural.
- » Areas of low sensitivity
 - Degraded and highly disturbed/transformed systems with little ecological function and are generally very poor in species diversity (most species are usually exotic or weeds).
 - Areas of low sensitivity include habitat units represented by transformed types and mining infrastructure, thereby contributing little towards local biodiversity.

8.3.3 Soils and Agricultural Potential Sensitive Features

The development area has been used for livestock farming, but it is assumed that the cattle grazing belongs to the local community nearby. The current landowner (Harmony) indicated that they do not have an agricultural activity on the properties. The soil and agricultural sensitivity of the site therefore varies between low and moderate, depending on the soil properties, topography and other landscape features of the development area.

No sensitivity higher than Medium has been identified for the proposed development

- » Medium Agricultural Sensitivity:
 - Various different soil types such as Bonheim, Valsrivier, and Swartland have been identified on site.

No crop cultivation has taken place within the development area. The soil and agricultural sensitivity of the site therefore varies between low and moderate, depending on the soil properties, topography and other landscape features of the development area.

No no-go areas have been identified for the proposed project from the perspective of soil and agricultural resource conservation.

8.3.4 Heritage Sensitive Features, the Cultural Landscape (incl. Archaeology, Palaeontology, and Cultural Landscape)

The areas surveyed as part of this assessment have been transformed through agricultural interventions and/or mining activity. As such, it is not surprising that the results of the survey only identified two sites of scientific cultural value - JL2, graded III C and JL5 graded III B within the area proposed for the Joel PV development.

» No-Go Area:

- The 30m buffer area recommended around site JL2 is implemented
- The 50m buffer area recommended around site JL5 is implemented

These areas must be excluded from the proposed development footprint.

The preferred site lies on the potentially fossiliferous Adelaide Subgroup (Beaufort Group, Karoo Supergroup) and the alternative site lies on moderately sensitive sands and alluvium of the Quaternary. The area has been greatly disturbed by farming and mining activities and no vertebrate fossils have been reported. According to the new biostratigraphy map, this is probably the *Daptocephalus* Assemblage Zone. No potential traps for Quaternary fossils (pans) are visible from the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMP. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once excavations have commenced.

8.3.5 Social Sensitive Features

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

Typically, major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income and will be similar to the impacts during the construction phase associated with construction activities. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. The impact of the decommissioning phase is expected to be negligible due to the small number of permanent employees affected. The potential impacts associated with decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling program. With mitigation, the impacts are assessed to be Low (negative).

The following preliminary ecological sensitivities have been identified:

» High Social Sensitivity:

- The Diggers in business centre and accommodation facility to the south east of the proposed development, this is the closest business to the development which is not part of mining infrastructure

» Medium Social Sensitivity:

- Local homesteads and properties mostly to the east and west of the site which do not belong to the mines, one such facility is the Mwelase Lifestyle Farm
 - The local golf courses especially the Brand Mashi golf course is anticipated to be impacted
- » Low Social Sensitivity:
- The local homesteads in the area
 - The mine and mining infrastructure in the area

8.3.6 Visual Sensitive Features

Visibility zones of the PV Facility mostly falls within vacant open space and agricultural land but does include some farm dwellings and residences. Potentially sensitive visual receptors include the diggers in as well as the Mwekase Lifestyle farm.

The traversing unnamed road is anticipated to have the highest visual impact relating to the solar PV facility; however the area is still surrounded by mining activities and therefore the solar PV will not impact the sense of place

A 10km radius from the project area was evaluated. The surrounding area comprises mostly of agricultural land, mining activities and to the north industrial and residential activities from the town of Welkom. The natural vegetation in the study area is dominated by two types of grasslands: the Vaal-Vet Sandy Grassland and the Highveld Alluvial Grassland. Much of these grasslands have been degraded throughout the region. Most of it has been transformed for cultivation and the rest under strong grazing pressure from cattle and sheep.

The area is located within a typical Highveld climate with moderately wet, warm summers and cold dry winters. The regional topography of the Northern Free State can be described as relatively flat, with rolling plains and low hills extending into the Welkom area. The rolling plain elevations range from 1 260 m amsl to 1 460 m amsl. The general slope of the terrain ranges from 1:250 to 1:100.

The most prominent (and visible) land use within the region is the mining activities, mining infrastructure and mine dumps. Interspersed with these mining activities are agricultural land uses, ranging from irrigated agriculture to the south-west and broader south and western area. Agricultural activities include the production of maize, wheat and sunflower crops, as well as cattle farming. The farmers working these fields predominantly reside at homesteads or farm residences scattered throughout the study area.

The N1 national road provides access to the region and is the main connecting route in between the Gauteng Province (Pretoria) and Welkom. The proposed PV facility site is accessible from both the M3 and the R730 via secondary roads.

Besides the large number of mines and mining infrastructure within the study area, there are numerous power lines and substations, predominantly associated with the mines. The proposed Harmony Joel Solar PV Facility is located approximately 5.5km north west of a small local landing strip.

8.4 Overall Conclusion and Fatal Flaw Analysis

The potentially sensitive areas which have been identified through the environmental scoping study are illustrated in **Figure 8.1**. The scoping phase sensitivity map provides an informed estimate of the sensitivity of the development area (outlined in Purple). The findings of the Scoping Study indicate that no environmental fatal flaws are associated with the Harmony Joel Solar PV project. While areas of high and very high sensitivity have been identified, it is anticipated that avoidance of these areas and/or the implementation of appropriate mitigation measures would assist in reducing the significance of impacts to acceptable levels. It is, therefore, recommended, that the development footprint for the development of the facility be outside of those areas identified as very high sensitivity (no-go areas) and high sensitivity as far as possible in order to ensure that the development does not have a detrimental impact on the environment. This forms part of the 'funnel-down approach' for the identification of an appropriate development footprint within the development area. Even with the appropriate avoidance of sensitive areas, there is an adequate area within the project site which can accommodate the development footprint for a 18MW facility, with relatively low impacts on the environment. This identified area is referred to as the development footprint and is demarcated with Orange shading on **Figure 8.1**. A 200m wide grid connection corridor is also demarcated in a Turquoise outline.

With an understanding of which areas within the development area and grid connection corridor are considered sensitive to the development of the proposed facility, the Applicant is able to design a detailed infrastructure layout for consideration by all relevant specialists in the EIA Phase. During the EIA phase, more detailed environmental studies will be conducted in line with the Plan of Study for EIA contained in **Chapter 9** of this Scoping Report. These studies will consider the detailed facility layout produced by the Applicant and make recommendations for the implementation of avoidance strategies (if required), and mitigation and management measures to ensure that the final assessed layout retains an environmental impact within acceptable limits. The sensitivity map will be further refined in the EIA phase on the basis of these specialist studies, in order to provide an assessment of environmental acceptability of the final design of the facility.

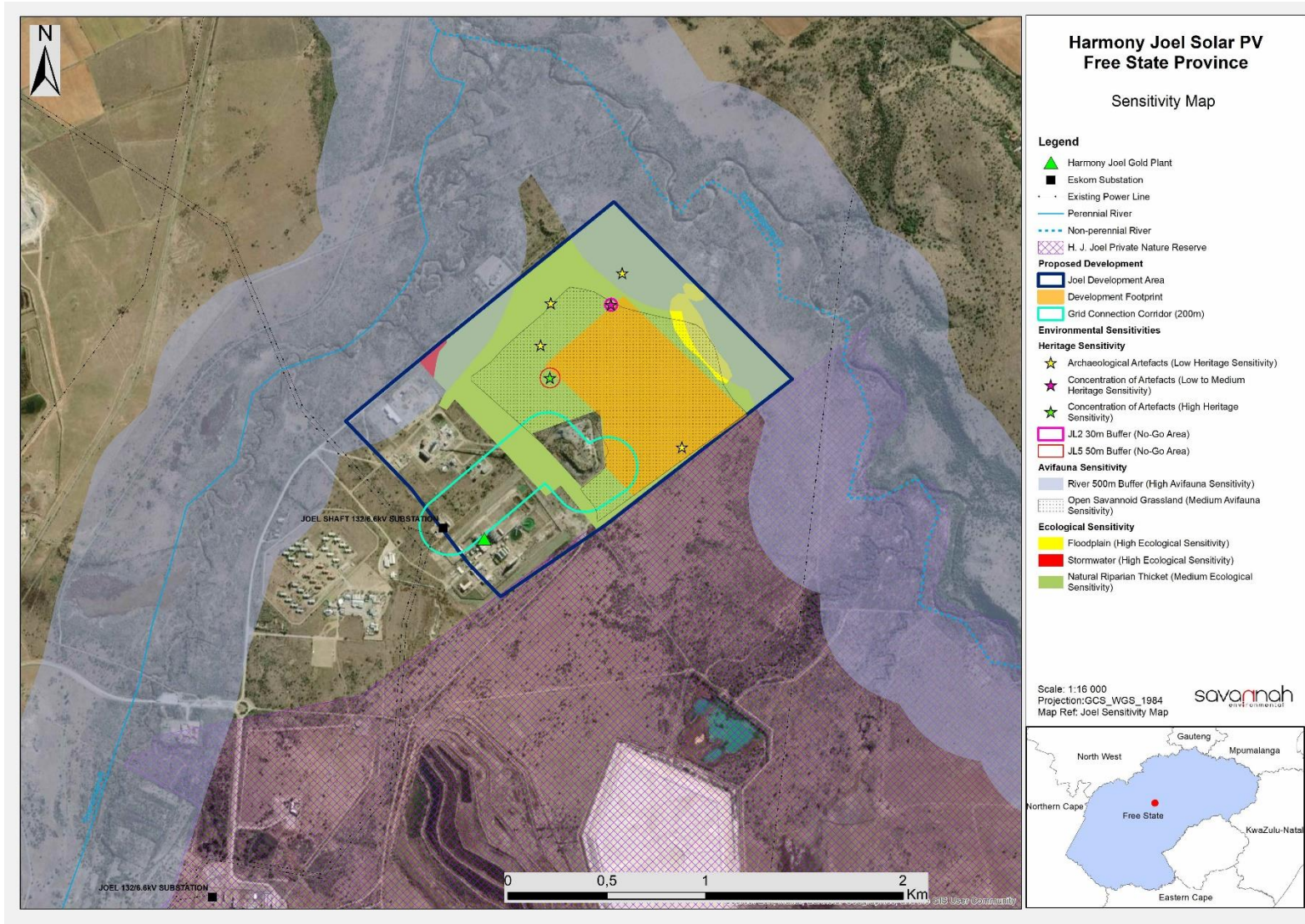


Figure 8.1: Environmental Sensitivity Map from the results of the scoping evaluation for the Harmony Joel Solar PV Facility. The sensitivity map indicates the sensitivities for the development area and includes the demarcation of an area for the development footprint which avoids sensitivities.

CHAPTER 9: PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT

One of the key objectives of the Scoping Phase is to determine the level of assessment to be undertaken within the EIA Phase of the process. This will include the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken. This is to determine the impacts and risks a particular activity will impose on a preferred site through the life of the activity (including the nature, significance, consequence, extent, duration and probability of the impacts) to inform the location of the development footprint within the preferred site.

This chapter contains the Plan of Study for the EIA for the Harmony Joel Solar PV Facility. The findings of the Scoping Phase include inputs from the EIA specialist team. The findings are used to inform the Plan of Study for EIA together with the requirements of the 2014 EIA Regulations (GNR 326) and applicable guidelines. The Plan of Study for EIA describes how the EIA Phase will proceed and includes details of the independent specialist studies required to be undertaken to assess the significance of those impacts identified within the Scoping Study to be of potential significance.

9.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the Undertaking of a Scoping Report

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
2(h) a plan of study for undertaking the environmental impact assessment process to be undertaken, including - <ul style="list-style-type: none"> (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; (ii) a description of the aspects to be assessed as part of the environmental impact assessment process; (iii) aspects to be assessed by specialists; (iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists; (v) a description of the proposed method of assessing duration and significance; (vi) an indication of the stages at which the competent authority will be consulted; (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and (viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process; (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored. 	A Plan of Study for the undertaking of the EIA Phase for the Harmony Joel Solar PV Facility is included within this chapter.

9.2 Objectives of the EIA Phase

The EIA Phase to be undertaken for the Harmony Joel Solar PV Facility and associated infrastructure will aim to achieve the following:

- » Provide an overall description and detailed assessment of the social and biophysical environment affected by the development of the Harmony Joel Solar PV Facility and associated infrastructure.
- » Assess potentially significant impacts (direct, indirect, and cumulative, where required) associated with the PV facility located within the development footprint and grid connection corridor (refer **Figure 9.1**).
- » Identify and recommend appropriate avoidance strategies and mitigation measures for potentially significant environmental impacts.
- » Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their comments are recorded.

The EIA will assess potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with each phase of the development including design, construction, operation and decommissioning; and will aim to provide the Competent Authority with sufficient information to make an informed decision regarding the proposed development. The site layout being proposed for the Harmony Joel Solar PV Facility will be assessed through detailed independent specialist studies. As required in terms of the 2014 EIA Regulations (GNR 326), as amended, the assessment will include consideration of the 'do nothing' alternative.

9.3 Consideration of Alternatives

The following project alternatives will be investigated in the EIA:

Type of Alternatives Considered	Description of the Alternatives relating to the Harmony Solar PV
Site-specific Alternatives	The Farm which is owned by the Applicant has been identified for the development of the Harmony Joel Solar PV facility, taking into consideration the site-specific characteristics such as the solar irradiation. The project site which is 1000 ha in extent and in which a development area and grid corridor has been identified, is considered to be large enough for the development of a PV facility with a contracted capacity of up to 18MW, while allowing for avoidance of environmental sensitivities, as may be required in line with the mitigation hierarchy.
Design and Layout Alternatives	The layout for the development of the Harmony Joel Solar PV Facility will be designed in line with the environmental sensitivities identified during this scoping phase. The detailed facility layout will be made available as a layout alternative for assessment and ground-truthing by the independent specialists in the EIA phase. Where further conflicts are predicted, a mitigation strategy will be developed to meet the objectives of the mitigation hierarchy (avoid, minimise, mitigate), thereby ensuring that the layout plan taken forward for consideration during the EIA Phase is the most optimal from an environmental perspective.
'Do-nothing' Alternative	The option to not construct the Harmony Joel Solar PV Facility. The 'do-nothing' alternative assumes that the site remains in its current state, that is status quo, and that the current land use practises only continue.

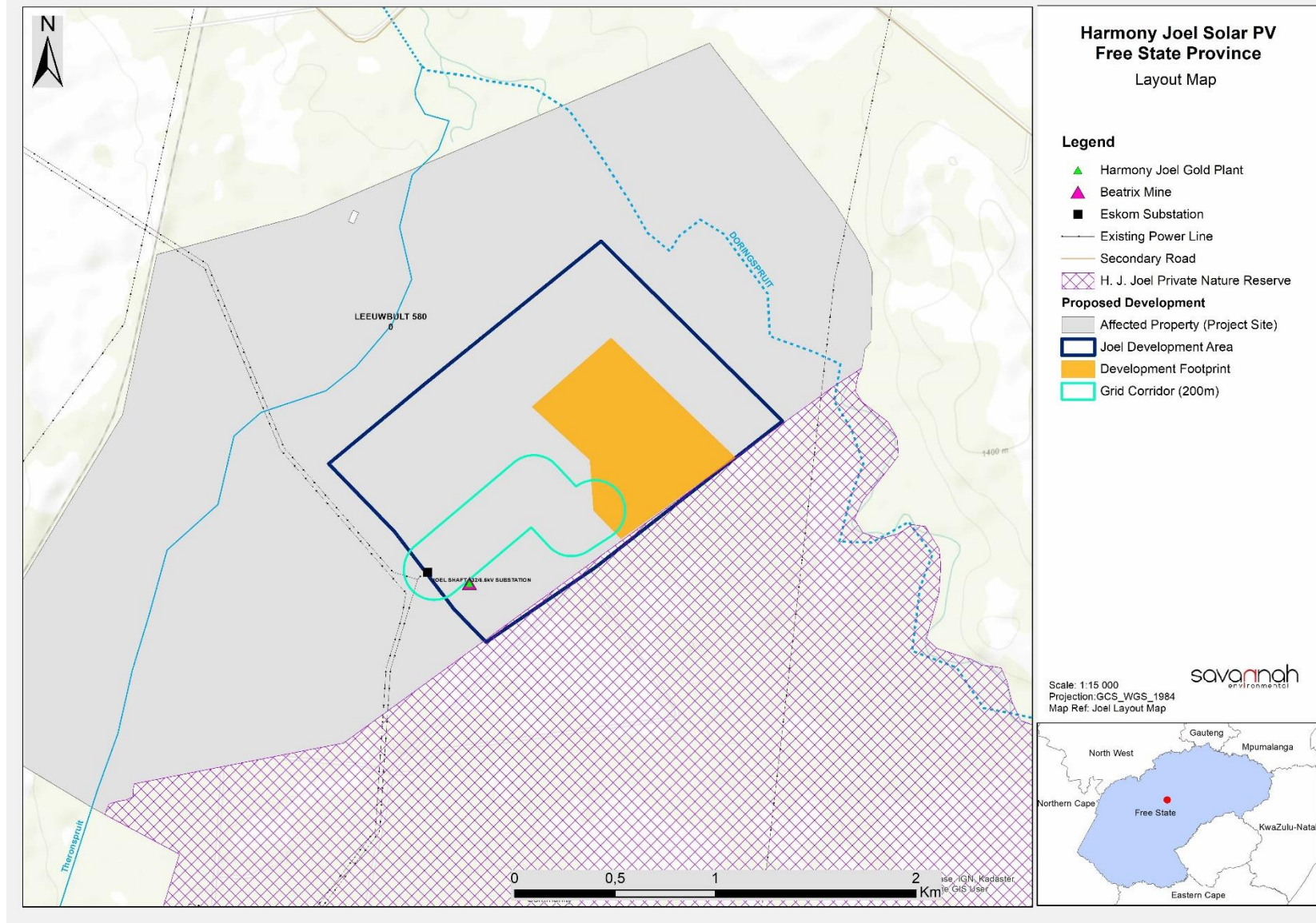


Figure 9.1. Development footprint map of the Harmony Joel Solar PV Facility and associated grid connection corridor which will be assessed further in the EIA Phase

9.4 Description of project to be assessed during the EIA Phase

9.4.1 Project description

The aspects or nature and extent of the project to be assessed as part of the EIA are detailed in **Table 9.1** below. A more detailed description of the activities associated with the construction and operation of the project is included in Chapter 2 of this Scoping Report.

Table 9.1: Activities and associated infrastructure to be assessed in the EIA

Component	Description / Dimensions
Total extent of the Affected Properties, also referred to as the project site	~ 1000 ha
Total extent of the PV Development area	~ 220 ha
Contracted capacity of the facility	18MW
Technology	» Monofacial or Bifacial PV panels, mounted on either fixed-tilt, or single-axis tracking systems
PV panels	» Height: 5m from ground level (installed).
Facility Substation	» On-site facility substation located on Portion 0 of the Farm Leeuwbult 580 » Approximately 2 ha in extent.
Switching Substation	» Switching substation located within Portion 0 of the Farm Leeuwbult 580. » Approximately 2ha in extent
Grid Connection	» Grid connection solution which will tie-in to Shafts 1 & 2 HJ Joel Mining Substation (located ~850m south west of the project site) via a 1.2km power line
Site and internal access	» Wherever possible, existing access roads will be utilised to access the project site and development area. Internal roads of up to 6m in width will be required to access the PV panels and the on-site substation.
Other infrastructure	» Laydown areas » Operations and Maintenance buildings » Control centre » Warehouse/ workshop

9.4.2. Scope of the EIA phase and EIA report

The EIA Report will be compiled in terms of the requirements of the EIA Regulations and include the information as required in Appendix 3 of GNR 326. The results of the specialist studies and other available information will be integrated, synthesised, and presented in the EIA Report by the Savannah Environmental project team. The EIA report will assess the overall environmental impacts associated with the development, consider mitigation measures as may be required, and make recommendations regarding the best development alternative. The EIA Report will also identify mitigation measures and provide management recommendations to minimise negative impacts and enhance benefits. The EIA Report will include:

- » The details and expertise of the EAP who prepared the report.

- » The location of the development footprint of the activity and a locality map illustrating the location of the proposed activity.
- » A description of the scope of the proposed activity including all listed activities triggered and a description of associated structures and infrastructure.
- » The policy and legislative context within which the development is located and an explanation of how the development complies and responds to the legislation and policy context.
- » The need and desirability of the proposed development of the activity in the context of the preferred location.
- » A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.
- » A description of the process followed to reach the proposed development footprint within the approved site, including:
 - * details of the development footprint considered;
 - * details of the public participation process undertaken in terms of Regulation 41 of the 2014 EIA Regulations, including copies of supporting documents;
 - * a summary of issues raised by interested and affected parties and the manner in which the issues were incorporated;
 - * the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
 - * the impacts and risks identified including the nature, significance, consequence extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated;
 - * the methodology used for determining and ranking the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks;
 - * positive and negative impacts that the activity and alternatives will have on the environment and the community;
 - * possible mitigation measures to be applied and the level of residual risk;
 - * a motivation for not considering alternative development locations;
 - * a concluding statement indicating the location of the preferred alternative development location; and
 - * a full description of the process followed to identify, assess and rank impacts of the activity and associated infrastructure on the preferred location including all environmental issues and risks that have been identified and an assessment of the significance of each issue and risk and the extent to which the issue/risk can be avoided or mitigated.
- » An assessment of the identified potentially significant impacts and risks.
- » A summary of the findings and recommendations of any specialist report and an indication as to how these findings and recommendations have been included.
- » An environmental impact assessment containing a summary of key findings, an environmental sensitivity map and a summary of the positive and negative impacts and risks of the proposed activity.
- » An Environmental Management Programme (EMPr), as per Appendix 4 of GNR326, containing the recommendations from specialists, the impact management objectives, and the impact management outcomes.
- » The final alternatives which respond to the impact management measures, avoidance and mitigation measures identified.
- » Any aspects which were conditional to the findings of the assessment.
- » Description of the assumptions, uncertainties and gaps in knowledge relating to the assessment and mitigation measures proposed.

- » An opinion as to whether the proposed activity should or should not be authorised and the conditions thereof.
- » An undertaking under affirmation by the EAP in relation to the correctness of the information, the inclusion of comments and inputs from stakeholders and interested and affected parties, the inclusion of inputs and recommendations from the specialists and any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.

The EIA Report will be released to the public, registered I&APs, relevant stakeholders, Organs of State and Authorities for a 30-day review and comment period. Comments received will be captured within a Comments and Responses Report, which will be included within the Final EIA Report, for submission to DESTEA for decision-making.

9.5 Specialist Assessments to be undertaken during the EIA Phase

A summary of the aspects which require further investigation within the EIA Phase through specialist studies, as well as the proposed activities to be undertaken in order to assess and ground truth the significance of the potential impacts is provided within **Table 9.2**. The specialists proposed to undertake detailed studies in the EIA Phase are also reflected within this table. These specialist studies will consider the development footprint proposed for the PV facility and all associated infrastructure, as well as feasible and reasonable alternatives identified for the project. The terms of reference for each specialist includes the following:

Table 9.2: Aspects requiring further investigation by specialists during the EIA Phase and terms of reference to assess the significance of the potential impacts relevant to the Harmony Joel Solar PV Facility

Aspect	Activities to be undertaken in order to assess significance of impacts	Specialist
<p>Ecology (Fauna and Flora)</p>	<p>Terrestrial Biodiversity (Fauna and Flora and Terrestrial Habitat) Assessment will be conducted in accordance with the protocols and procedures of GN320 of 2020.</p> <p><u>Sensitivity Analysis and EIA assessment</u></p> <p><u>The following activities are proposed during the EIA Phase:</u></p> <ul style="list-style-type: none"> » A detailed ecological assessment in accordance with the protocols and procedures of GN 320 of 2020. » Verify in the field the draft sensitivity map as contained in this report to confirm the sensitivity and no-go areas associated with delineated features/habitats. » Check the habitat on-site to verify the potential presence of fauna. » Validate the CBA area that is present on the site and provide evidence and maps to indicate the actual likely location of areas of higher importance for ecological processes. » Verify the nature and quality of the affected habitat in order to better assess the cumulative impacts that are likely to result from the development of the site as a PV facility. » Identify any additional mitigation and avoidance measures for inclusion in the EMPr that should be implemented to further reduce the impacts of the development on terrestrial biodiversity. » Field surveys to prioritise the development areas and identify risks. <p><u>Assessment of Impacts for the EIA</u></p> <p>The methodology described in Section 9.6 assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p><u>Environmental Management Programme</u></p> <p>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>	<p>Darius van Rensburg DPR Ecologist and Environmental Services</p>

Aspect	Activities to be undertaken in order to assess significance of impacts	Specialist
<p>Freshwater resources (including all waterbodies and wetlands)</p>	<p>Freshwater resources located within the development area will be further assessed during the EIA Phase in accordance with the protocols and procedures of GN 320 of 2020 as well as the requirements of the Department of Water and Sanitation Risk Assessment Matrix.</p> <p><u>Sensitivity Analysis and EIA assessment</u></p> <p><u>The following activities are proposed during the EIA Phase:</u></p> <ul style="list-style-type: none"> » Identify, delineate, and characterise water resources. » Undertake a functional assessment of systems, where applicable. » Determine a suitable buffer width for the resources. » Undertake a field survey during the wet season period that prioritises the development areas, but also considers the 500m regulated area. <p><u>Assessment of Impacts for the EIA:</u></p> <p>The methodology described in Section 9.6 assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p><u>Environmental Management Programme:</u></p> <p>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>	<p>Darius van Rensburg DPR Ecologist and Environmental Services</p>
<p>Avifauna</p>	<p>An avifauna impact assessment will be undertaken in accordance with the protocols and procedures of GN 320 of 2020 as well as the Best Practice Guidelines for Solar Developments and will be informed by the results 6-month pre-construction monitoring programme.</p> <p><u>The EIA Phase will include the following activities:</u></p> <ul style="list-style-type: none"> » Description of the affected environment from an avifaunal perspective. » Discussion of gaps in baseline data and other limitations. 	<p>Lukas Niemand Pachnoda Consulting</p>

Aspect	Activities to be undertaken in order to assess significance of impacts	Specialist
	<ul style="list-style-type: none"> » Description of the methodology that was used for the field surveys. » Comparison of the site sensitivity recorded in the field with the sensitivity classification in the DFFE National Screening Tool and adjustment if necessary. » Provision of an overview of all applicable legislation. » Provision of an overview of assessment methodology. » Identification and assessment of the potential impacts of the proposed development on avifauna including cumulative impacts. » Provision of sufficient mitigation measures to include in the Environmental Management Programme (EMPr). » Conclusion with an impact statement whether the PV facility is fatally flawed or may be authorised. <p><u>Assessment of Impacts for the EIA:</u> The methodology described in Section 9.6 assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p><u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>	
<p>Soils and Agricultural Potential</p>	<p><u>The EIA Phase will include the following activities:</u></p> <p>The soils impact assessment will include the consideration of aspects related to agricultural aspects in accordance with the protocols and procedures of GN 320 of 2020. The assessment will also include:</p> <ul style="list-style-type: none"> » Identification and delineation of soils forms. » Determination of soil sensitivity. » Undertake a field survey that will prioritise the development areas. <p><u>Assessment of Impacts for the EIA:</u> The methodology described in Section 9.6 assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of</p>	<p>Marine' Pienaar Terra Africa</p>

Aspect	Activities to be undertaken in order to assess significance of impacts	Specialist
	<p>environmental impacts is to be assessed by means of criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p><u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>	
<p>Heritage (including Cultural Landscape, Archaeology and Palaeontology)</p>	<p>As part of the EIA, it is necessary to undertake a Heritage and Archaeological Study to fulfil the SAHRA requirements in accordance with the National Heritage Resources Act (No. 25 of 1999). A Heritage and Archaeological Impact Assessment (including archaeology, heritage, cultural landscape and palaeontology) will therefore be conducted, the primary objective of which is to determine the heritage and archaeological significance of features on the site as well as the significance of the cultural landscape.</p> <p><u>The EIA Phase will include the following activities:</u></p> <ul style="list-style-type: none"> » Undertake field assessments in order to fill the identified gaps in knowledge. The archaeological field surveys will provide sufficient ground-coverage of the areas to be developed to be able to determine the nature of the resources likely to be impacted. » The palaeontological and cultural landscape field surveys will target sensitive geological and cultural landscape features. <p><u>Assessment of Impacts for the EIA:</u> The methodology described in Section 9.6 assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p><u>Environmental Management Programme:</u></p>	<p>Jenna Lavin CTS Heritage</p>

Aspect	Activities to be undertaken in order to assess significance of impacts	Specialist
	For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.	
Social	<p><u>The EIA Phase will include the following activities:</u></p> <p>Based on the findings of the social impact assessment, the following approach to the EIA Phase studies is proposed:</p> <ul style="list-style-type: none"> » Review comments pertaining to social impacts received from members of the public, key stakeholders, and any organ of state during the public review of the Scoping Report. Where applicable, comments received from the Department of Environment, Forestry and Fisheries on the Final Scoping Report (FSR), which may pertain to social impacts or have relevance to the SIA, will also be reviewed. » Collect primary data during a site visit. Interview directly affected and adjacent landowners, and key stakeholders to obtain primary information related to the project site, social environment, and to gain their inputs on the proposed project and its perceived social impact (positive and /or negative). » Update the baseline information with information received during the site visit, as well as any additional information received from the client, or updates to the project description. » Assess impacts identified for the project in terms of their nature, extent, duration, magnitude, probability, status, and significance; as well as the degree to which the impact can be reversed, may cause irreplaceable loss of resources, and can be mitigated. » Identify mitigation measures with which to reduce negative impacts and enhance positive impacts for inclusion in the Environmental Management Programme (EMPr). As far as possible the mitigation hierarchy of "avoid, minimise, and reduce" will be followed in the mitigation of potential negative impacts. » Identify any conditions for inclusion in the Environmental Authorisation (EA). » Identify any monitoring requirements for inclusion in the EMPr or EA. » Provide a reasoned opinion regarding the acceptability of the project, and whether the proposed project should be authorised. » Prepare a SIA Report for inclusion in the EIA Report to be prepared for the project. <p><u>Assessment of Impacts for the EIA:</u></p> <p>The methodology described in Section 9.6 assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p>	Brogan Geldenhuys Eco-Thunder Consulting

Aspect	Activities to be undertaken in order to assess significance of impacts	Specialist
	<p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p><u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>	
<p>Visual</p>	<p><u>The EIA Phase will include the following activities:</u></p> <p>Based on the findings of the social impact assessment, the following approach to the EIA Phase studies is proposed:</p> <ul style="list-style-type: none"> » Review comments pertaining to visual impact received from members of the public, key stakeholders, and any organ of state during the public review of the Scoping Report. Where applicable, comments received from the Department of Environment, Forestry and Fisheries on the Final Scoping Report (FSR), which may pertain to social impacts or have relevance to the VIA, will also be reviewed. » Update the baseline information with information received during the site visit, as well as any additional information received from the client, or updates to the project description. » Assess impacts identified for the project in terms of their nature, extent, duration, magnitude, probability, status, and significance; as well as the degree to which the impact can be reversed, may cause irreplaceable loss of resources, and can be mitigated. » Identify mitigation measures with which to reduce negative impacts and enhance positive impacts for inclusion in the Environmental Management Programme (EMPr). As far as possible the mitigation hierarchy of “avoid, minimise, and reduce” will be followed in the mitigation of potential negative impacts. » Identify any conditions for inclusion in the Environmental Authorisation (EA). » Identify any monitoring requirements for inclusion in the EMPr or EA. » Provide a reasoned opinion regarding the acceptability of the project, and whether the proposed project should be authorised. » Prepare a VIA Report for inclusion in the EIA Report to be prepared for the project. » Subject the VIA Report prepared for the project for inclusion in the EIA Report to external peer review. <p><u>Assessment of Impacts for the EIA:</u> The methodology described in Section 9.6 assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of</p>	<p>Marti Le Roux Eco-Thunder Consulting</p>

Aspect	Activities to be undertaken in order to assess significance of impacts	Specialist
	<p>environmental impacts is to be assessed by means of criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p><u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>	
<p>Cumulative Assessment</p>	<p>Assess the cumulative impacts associated with the construction and operation of more than one development (i.e., renewable energy developments) within 30km of the project site on the ecological & Freshwater, heritage, soil and agricultural potential, avifaunal, social, and visual impacts of the area.</p> <p><u>The objective is to identify and focus on potentially significant cumulative impacts so these may be taken into consideration in the decision-making process. The following will be considered:</u></p> <ul style="list-style-type: none"> » 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 PV infrastructures. » 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). » Unacceptable impact to social factors and components. » Unacceptable impact to visual 	<p>All</p>

9.6 Assessment of Potential Impacts Associated with the Project

Direct, indirect, and cumulative impacts of the above issues identified through this Scoping Study will be assessed in terms of the following criteria:

- » The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
 - * local extending only as far as the development site area – assigned a score of 1;
 - * limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
 - * will have an impact on the region – assigned a score of 3;
 - * will have an impact on a national scale – assigned a score of 4; or
 - * will have an impact across international borders – assigned a score of 5.
- » The **duration**, wherein it will be 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; or
 - * 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); and
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be 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); and
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- » the **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- » the **status**, which will be 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).

The specialist studies and EIA report will also consider that:

- » Impacts should be described in terms of before and after the proposed mitigation and management measures have been implemented.
- » All impacts should be evaluated for the full lifecycle of the proposed development, including construction, operation, and decommissioning.
- » The impact assessment should take into consideration the cumulative effects associated with this and other similar developments which are either developed or in the process of being developed in the region. 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 will consider 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 applicant has the responsibility to avoid and/or minimise impacts as well as plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of mitigated impacts will demonstrate the effectiveness of the proposed mitigation measures.

The results of the impact assessment studies, and other available information will be integrated by the Savannah Environmental project team. The EIA Report will be compiled in terms of the requirements of the 2014 EIA Regulations (GNR 326) and will include:

- » The details and expertise of the EAP who prepared the report.
- » The location of the activity and a locality map illustrating the location of the proposed activity.
- » A description of the scope of the proposed activity including all listed activities triggered and a description of associated structures and infrastructure.

- » The policy and legislative context within which the development is located and an explanation of how the development complies and responds to the legislation and policy context.
- » The need and desirability of the proposed development of the activity in the context of the preferred location.
- » A motivation for the preferred development footprint within the approved site.
- » A description of the process followed to reach the proposed development footprint within the approved site, including:
 - * Details of the development footprint considered.
 - * Details of the public participation process undertaken in terms of Regulation 41 of the 2014 EIA Regulations, including copies of supporting documents.
 - * A summary of issues raised by interested and affected parties and the manner in which the issues were incorporated.
 - * The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.
 - * The impacts and risks identified including the nature, significance, consequence extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated.
 - * The methodology used for determining and ranking the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks.
 - * Positive and negative impacts that the activity and alternatives will have on the environment and the community.
 - * Possible mitigation measures to be applied and the level of residual risk.
 - * A motivation for not considering alternative development footprint.
 - * A concluding statement indicating the preferred alternative development footprint.
 - * A full description of the process followed to identify, assess and rank impacts of the activity and associated infrastructure on the preferred location including all environmental issues and risks that have been identified and an assessment of the significance of each issue and risk and the extent to which the issue/risk can be avoided or mitigated.
- » An assessment of the identified potentially significant impacts and risks.
- » A summary of the findings and recommendations of any specialist report and an indication as to how these findings and recommendations have been included.
- » An environmental impact assessment containing a summary of key findings, an environmental sensitivity map, and a summary of the positive and negative impacts and risks of the proposed activity.
- » Recommendations from specialist, the recording of proposed impact management objectives and the impact management outcomes for inclusion in the EMP as well as inclusion as conditions of authorisation.
- » The final alternatives which respond to the impact management measures, avoidance and mitigation measures identified.
- » Any aspects which were conditional to the findings of the assessment.
- » A description of the assumptions, uncertainties and gaps in knowledge relating to the assessment and mitigation measures proposed.
- » An opinion as to whether the proposed activity should or should not be authorised and the conditions thereof.
- » An undertaking or affirmation by the EAP in relation to the correctness of the information, the inclusion of comments and inputs from stakeholders and interested and affected parties, the inclusion of inputs and recommendations from the specialists, and any information provided by the EAP to interested and

affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.

The EIA Report will be released to the public and relevant stakeholders, Organs of State and Authorities for a 30-day review period. Comments received from I&APs will be captured within a Comments and Response Report, which will be included within the EIA Report, for submission to DESTEA For decision-making.

9.7 Authority Consultation

Consultation with the DESTEA, as the competent authority, has been undertaken in the Scoping Phase and will continue throughout the EIA process. On-going consultation will include the following:

- » Submission of a Final Scoping Report following a 30-day review period which will include all comments and issues raised during the review period as well as appropriate responses to the comments.
- » Submission of an EIA Report and EMPr for a 30-day review and comment period.
- » Submission of a Final EIA Report and EMPr following a 30-day review period which will include all comments and issues raised during the review period as well as appropriate responses to the comments received.
- » Consultation and an authority site visit (if required) in order to discuss the findings and conclusions of the EIA Report.

9.8 Public Participation Process

A public participation process will be undertaken by Savannah Environmental during the EIA phase. Consultation with key stakeholders and I&APs will be on-going throughout the EIA Phase. Through this consultation process, stakeholders and I&APs will be encouraged to verify that their issues were recorded in the Scoping Phase, identify additional issues of concern or highlight positive aspects of the proposed project, and comment on the findings of the EIA Phase. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their inputs, various opportunities will be provided for stakeholders and I&APs to be involved in the EIA Phase of the process, as follows:

- » Focus group meetings (pre-arranged and I&APs invited to attend) via the use of virtual platforms (Zoom or MS Teams).
- » One-on-one consultation meetings with smaller groups or individuals via telephone or virtual platforms.
- » Telephonic consultation sessions (consultation with various parties from the EIA project team, including the public participation consultant, lead EIA consultant, as well as specialist consultants).
- » Written, faxed or e-mail correspondence.

The public participation process will include the following activities:

- » Placement of advertisements in a local newspaper (Volksblad Newspaper).
- » Maintain an I&AP database.
- » Release of the EIA Report for a 30-day review and comment period.
- » Ongoing consultation with all registered I&APs regarding the progress of the EIA process and the outcomes or findings of the EIA Report through stakeholder consultation via notification letters, telephone calls, focus group meetings, depending on the specific needs of the stakeholders in the area.
- » Facilitate comments on the EIA Report.

- » Compile a Comments and Responses Report and evidence of the public participation process undertaken to be included in the final EIA Report for decision-making.

The EIA Report will be made available for a 30-day review period prior to finalisation and submission to the DESTEA for decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, opportunity for public involvement will be provided, depending on the specific needs of the stakeholders in the area. All comments received during the public review period will be included within the final report to be submitted to the DFFE for review and decision-making.

9.9 Key Milestones of the Programme for the EIA

The envisaged key milestones of the programme for the EIA Phase are outlined in the following table (and include indicative dates):

Key Milestone Activities	Proposed timeframe ¹⁵
Make Scoping Report available to the public, stakeholders and authorities (30 days)	14 November 2022 to 14 December 2022
Finalisation of Scoping Report, and submission of the Final Scoping Report to DESTEA	January 2023
Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA (43 days)	Within 43 days of receipt of the Final Scoping Report
Make EIA Report and EMPr available to the public, stakeholders and authorities (30 days)	February 2023
Finalisation of EIA Report, and submission of the Final EIA Report to DESTEA	March 2023
Authority review period and decision-making (107 days)	Within 107 days of submission of the Final EIA Report to the DESTEA

¹⁵ Indicative dates.

CHAPTER 10: REFERENCES

Heritage Impact Assessments				
NID	Author(s)	Date	Type	Title
6036	AIA Phase 1	Cobus Dreyer	15/09/2005	Archaeological and Historical Investigation of the Proposed New Filling Station at Virginia, Free State
7579	AIA Phase 1	Cobus Dreyer	10/03/2008	First Phase Archaeological and Cultural Heritage Investigation of the Proposed Oppenheimer Park Golf Estate, Welkom, Free State
7625	AIA Phase 1	Francois P Coetzee	01/02/2008	Cultural Heritage Survey of the Proposed Phakisa Housing Development, Welkom, Free State
7724	AIA Phase 1	Cobus Dreyer	20/06/2007	First Phase Archaeological and Cultural Heritage Assessment of the Proposed New MTN Cell Phone Mast at Pumlani Cemetery, Thabong, Welkom, Free State
7863	AIA Phase 1	Cobus Dreyer	30/08/2006	First Phase Archaeological and Cultural Heritage Investigation of the Proposed Sandrivier Golf Estate, Virginia, Free State
8034	AIA Phase 1	Cobus Dreyer	05/03/2004	Archaeological and Historical Investigation of the Graves at the Proposed Housing Developments near Thabong, Welkom, Free State
108777	Heritage Impact Assessment Specialist Reports	Anton van Vollenhoven	30/11/2011	A REPORT ON A CULTURAL HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED WITS GOLD DBM PROJECT CLOSE TO VIRGINIA, FREE STATE PROVINCE
117067	HIA Phase 1	Frans Prins	31/01/2013	Cultural Heritage Desktop Assessment of the proposed Bio-energy Facility, Harmony Gold Mine , Welkom, Free State Province
120259	PIA Desktop	Barry Millsteed		Desktop Palaeontological Heritage Impact Assessment Report for the Oryx Solar Energy Facility
120639	Archaeological Specialist Reports	Jaco van der Walt	30/08/2013	Archaeological Impact Assessment report for the Proposed Everest Solar Energy Facility
124729	Heritage Scoping	Jaco van der Walt	08/05/2013	Archaeological Scoping Report for the Proposed Oryx Energy Facility
136650	Archaeological Specialist Reports	Jaco van der Walt	30/08/2013	Archaeological Impact Assessment report for the Oryx Solar Energy Facility
138939	Heritage Impact	Karen Van Ryneveld,	17/10/2013	Phase 1 Archaeological Impact Assessment & Palaeontological Assessment

	Assessment Specialist Reports	Gideon Groenewald		Lebone Solar Farm The Remaining Extent of the Farm Onverwag No. 728 and Portion 2 of the Farm Vaalkranz Np. 220, Welkom, Free State Province
158469	Heritage Impact Assessment Specialist Reports	Karen Van Ryneveld	19/10/2013	PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT. THE THABONG SOLAR FARM, UITKYK 509, WELKOM, FREE STATE, SOUTH AFRICA
164148	Heritage Impact Assessment Specialist Reports	Lloyd Rossouw	06/12/2013	Phase 1 Palaeontological and Archaeological Impact Assessment of the proposed Phokeng Township extension at Thabong, Matjhabeng Local Municipality, Free State Province.
169703		Lloyd Rossouw		
186709	PIA Desktop	Gideon Groenewald	14/10/2013	PALAEONTOLOGICAL ASSESSMENT OF THE PROPOSED DEVELOPMENT OF A 75MW PHOTOVOLTAIC SOLAR FARM, ON THE FARM UITKYK 509, WELKOM, FREE STATE PROVINCE.
302636	Archaeological Specialist Reports	Jaco van der Walt	17/06/2015	Archaeological Impact Assessment Report for the Proposed Harmony Gold Eland PV Facility in Welk, Free State Province
302640	Archaeological Specialist Reports	Jaco van der Walt	17/06/2015	Archaeological Impact Assessment Report for the Proposed Harmony Gold NyalaPV Facility in Welk, Free State Province
310004	PIA Desktop	Marion Bamford	03/07/2015	Palaeontological Impact Assessment for three Proposed PV Solar Facilities for Harmony Gold Mining Company, Odendaalsrus, Free State Province
110093	PIA Desktop	Job M. Kibii		Palaeontological Impact Assessment Desktop Study Report for the Proposed Merapi (Excelsior) PV Solar Energy Facilities
110094	HIA Phase 1	Nkosinathi Godfrey Tomose		Heritage Impact Assessment Study for the Proposed PV Solar Energy Facilities, near Excelsior, Free State Province
117067	HIA Phase 1	Frans Prins	31/01/2013	Cultural Heritage Desktop Assessment of the proposed Bio-energy Facility, Harmony Gold Mine , Welkom, Free State Province
120639	Archaeological Specialist Reports	Jaco van der Walt	30/08/2013	Archaeological Impact Assessment report for the Proposed Everest Solar Energy Facility
120639	Archaeological	Jaco van der Walt	30/08/2013	Archaeological Impact Assessment report for the Proposed Everest Solar Energy Facility

	Specialist Reports			
323795	Heritage Impact Assessment Specialist Reports		31/03/2014	Cultural Heritage Impact Assessment Report for the Proposed SANRAL Thabong Interchange Development, Welkom Region, Free State Province
384235	AIA Phase 1	Lloyd Rossouw	30/09/2016	Phase 1 Archaeological Impact Assessment of a proposed new water pipeline and associated infrastructure between Ventersburg and the Koppie Alleen pump station, FS Province
384495	Heritage Scoping	Nkosinathi Godfrey Tomose	20/12/2016	Heritage Scoping Study for the Proposed Prospecting Rights Application on Farms Adamsons Vley 655, Jonkers Rust 72, Du Preez Leger 324 and Stillewoning 703
384495	Heritage Scoping	Nkosinathi Godfrey Tomose	20/12/2016	Heritage Scoping Study for the Proposed Prospecting Rights Application on Farms Adamsons Vley 655, Jonkers Rust 72, Du Preez Leger 324 and Stillewoning 703

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