KIARA PV3 FACILITY AND ASSOCIATED INFRASTRUCTURE NORTH WEST PROVINCE

Environmental Impact Assessment Report

DFFE Reference: 14/12/16/3/3/2/2174

January 2023

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PROJECT DETAILS

DFFE Reference	:	14/12/16/3/3/2/2174
Title	:	Environmental Impact Assessment Report for the Kiara PV3 Facility and Associated Infrastructure North West Province
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Applicant	:	Voltalia South Africa (Pty) Ltd
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When used as a reference this report should be cited as: Savannah Environmental (2023) Environmental Impact Assessment Report for the Kiara PV3 Facility North West Province.

PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT

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

This EIA Report consists of ten chapters, which include:

Chapter 1 provides background to the Kiara PV3 Facility and associated infrastructure and the environmental impact assessment process.
Chapter 2 provides a description of the Kiara PV3 Facility and associated infrastructure and description of Solar PV as a power generation technology
Chapter 3 provides the site selection information and identified Kiara PV3 Facility and associated infrastructure alternatives.
Chapter 4 outlines strategic regulatory and legal context for energy planning in South Africa
Chapter 5 outlines the need and desirability of the Kiara PV3 Facility and associated infrastructure.
Chapter 6 outlines the process which was followed during the EIA process.
Chapter 7 describes the existing biophysical and social environment within and surrounding the study and development area.
Chapter 8 provides an assessment of the potential the direct and indirect impacts associated with the proposed Kiara PV3 Facility and associated infrastructure.
Chapter 9 provides an assessment of cumulative impacts associated with the proposed Kiara PV3 Facility and associated infrastructure.
Chapter 10 presents the conclusions and recommendations of the EIA for the Kiara PV3 Facility and associated infrastructure.
Chapter 11 provides references used to compile the EIA Report.

The EIA Report is available for review from **Friday, 20 January 2023** to **Monday, 20 January 2023** at (https://savannahsa.com/public-documents/energy-generation/). All comments received and recorded during the 30-day review and comment period have will be included, considered and addressed within the final EIA report for the consideration of the Department of Forestry and Fisheries (DFFE).

Please submit your comments by **Monday, 20 January 2023** to:
Bregardia Rabbie PO Box 148, Sunninghill, 2157 Tel: 011-656-3237 Fax: 086-684-0547 Email: publicprocess@savannahsa.com

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

EXECUTIVE SUMMARY

Voltalia South Africa (Pty) Ltd is proposing the development of a commercial photovoltaic (PV) solar energy facility and associated infrastructure on a site located approximately 16km north-east of the town of Lichtenburg, within the Ditsobotla Local Municipality and the Ngaka Modiri Molema District Municipality in the North West Province (refer to **Figure 1**). The facility will have a contracted capacity of up to 130MW and will be known as the Kiara PV3 Facility. The project is planned as part of a larger cluster of renewable energy projects, which include six (6) additional PV facilities, each up to 130MW (known as the Kiara PV1, Kiara PV2, Kiara PV3, Kiara PV5, Kiara PV6, and Kiara PV7) and grid connection infrastructure connecting the facilities to the existing Watershed Substation. These projects are proposed by separate Specialist Purpose Vehicles (SPVs)[1], and are assessed through separate Environmental Impact Assessment (EIA) processes.

The Kiara PV3 Facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid the Kiara PV3 Facility under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or similar programme, with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP), with the Kiara PV3 Facility set to inject up to 120MW into the national grid.

From a regional perspective, the North West Province, and particularly the area under investigation, is considered favourable for the development of a commercial solar facility by virtue of prevailing climatic conditions, relief, the extent of the affected properties, the availability of a direct grid connection (i.e., a point of connection of the national grid) and the availability of land on which the development can take place.

No environmental fatal flaws were identified for Kiara PV3 Facility in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of highly sensitive features within the project site by the development footprint and the undertaking of monitoring, as specified by the specialists.

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

- Impacts on ecology, flora and fauna.
- Impacts on avifauna.
- Impacts on aquatic ecology
- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual Impacts.
- Social impacts.

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

The majority of the project site still consists of natural grassland which is still in a fairly good condition. Some disturbance is present though in general these are localised or has been able to re-establish a near natural grass layer. The surrounding areas are also largely still natural, and the area is therefore not affected to a large extent by cumulative transformation pressures. However, it is well known that the larger area has been increasingly subjected to applications for solar energy developments and the cumulative impact that this transformation will have will steadily increase over time.

The description of the proposed development area indicates a relatively uniform habitat, with moderate species diversity and largely without any unique habitats or areas of high diversity. Furthermore, the vegetation consists of Carletonville Dolomite Grassland, which although it has a significant species diversity, is currently listed as being of Least Concern (LC) which also does not contribute toward its conservation value. Overall, the vegetation in the study area can therefore not be regarded as exceeding a Moderate level of sensitivity. Areas of localised high conservation value may however still be present, and which may require exclusion from development. The proposed development of Kiara PV3 of the development contains a few such rocky areas containing a notably higher species diversity with less common and protected plant also being present. Kiara PV3 is also located adjacent to the lower lying drainage area which is considered to have a high conservation value.

A few rocky areas occurring in Kiara PV3 of the development and is notably higher in terms of species diversity and protected plant species. These areas also contain uncommon, protected species with a higher conservation value. Such species included the uncommon succulent, Euphorbia davyi and protected succulent, Orbea lutea subsp. lutea. Owing to the higher diversity of some of these rocky areas as well as the presence of plant species which are protected and less common, a few of these areas have been designated as having a high level of sensitivity. Furthermore, the Marico Biosphere Reserve also border the study area to the north.

10.2.2 Impact on Avifauna

The assessment area consists of four avifauna habitats; transformed areas, degraded grassland, grassland and bushclumps. These habitats were still mostly in a natural state with the exception of some areas that have been disturbed by livestock grazing and transformed due to anthropogenic activities. Two SCC were confirmed in the assessment area and surrounds Cape Vulture (Gyps coprotheres) and Greater Flamingo (Phoenicopterus roseus) (which is likely to fly over the assessment area). There is a possibility that additional conservation important and sensitive vulture species occur within the project area. Some high-risk avifauna species were recorded from the project area and surrounds, including both raptors and water birds.

The project will result in habitat loss and degradation of avifaunal habitats. The development will lead to the clearing of vegetation and an altering in the undeveloped nature of the area. Based on the medium receptor resilience and the medium functional integrity, the assessment area was given a medium to low site ecological importance with transformed areas having a very low site ecological importance (SEI).

The development will also lead to sensory disturbance, collision and electrocution risks. Even though the latter three impacts can be effectively mitigated, the loss of habitat cannot be mitigated. Considering the number of applications and current solar plant developments in the area the cumulative impact is regarded as being high.

Mitigation measures that have provided have resulted in the reduction of most impacts to a Moderate or Low, which is considered within the limits of acceptable change. It is the opinion of the specialist that the project may be considered for approval, but all prescribed mitigation measures and monitoring must be considered by the issuing authority. Any power lines that may be developed must be extensively mitigated due to the presence of a vulture restaurant in the vicinity.

10.2.3 Impacts on Land Use, Soils and Agricultural Potential

The largest part of the total area assessed, has Low agricultural potential (160.9ha). Low agricultural potential has been assigned to soils of the Mispah and Glenrosa forms because of the shallow soil depth. Moderate agricultural potential is allocated to the Hutton soil form due to its deep soil depth and was found in the north-western part of the study area (8.1ha).

It is anticipated that the construction and operation of the Kiara PV3 Facility will have impacts that range from medium to low. Through the consistent implementation of the recommendation mitigation measures, most of impacts can all be reduced to low. It is my professional opinion that this application be considered favourably, permitting that the mitigation measures are followed to prevent soil erosion and soil pollution and to minimise impacts on the veld quality of the farm portions that will be affected. The project infrastructure should also remain within the proposed development area that will be fenced off.

10.2.4 Impacts on Heritage Resources (incl. archaeology and palaeontology)

Archaeology

No stone age archaeological resources were identified during the field assessment despite the presence of abundant raw material sources. In other nearby projects, Stone Age archaeological resources that were identified were graded as having low levels of scientific significance. As such, it is very unlikely that the proposed development will impact on significant Stone Age archaeological heritage.

A number of stone structures were identified within the study area. These have been categorised as either kraals or ruins of varying heritage value. Where the kraals and ruins form part of a cluster of resources, these have been graded as IIIC for their historical contextual significance and their contribution to the cultural landscape. It is recommended that a no-development buffer of 20m is implemented around these Grade IIIC structures. Where ruins or kraals are isolated on the landscape, their heritage value is limited and as such, these have been graded as Not Conservation-Worthy (NCW).

A number of graves were identified within the areas proposed for development. All the graves are ascribed high local levels of cultural value and as such, are graded IIIA. It is important that human remains are not disturbed through the process of construction of this development.

The clusters of resources have been mapped with their recommended no-go buffer areas in the maps below. In order to conserve the integrity of the relationship between the kraals, ruins and graves, it is recommended that the clusters as mapped below are considered to be no-go areas for the proposed development.

Palaeontology

Geological units within the development area range from very highly sensitive dolomites of the Monte Christo Formation of the Malmani Subgroup to moderately sensitive, recent, alluvium.

Following observations during the field investigation as well as data obtained from previous palaeontological impact assessments in this region, it is our professional opinion that significant stromatolites from the Malmani Subgroup are abundantly present in this area.

The excavations for the construction of the proposed Kiara PV3 Facility will most probably expose some sediments that are very highly sensitive geological formations and some sites revealed evidence of very highly significant remains of fossils. A significant part of the excavation project will cut into rocks of the Malmani Subgroup, Chuniespoort Group of the Transvaal Supergroup. This unit has a very high sensitivity for palaeontological heritage. Impacts to the sensitive geology can be mitigated through the implementation of the attached Chance Fossil Finds Procedure for the duration of construction activities

10.2.5 Visual Impacts

The construction and operation of the proposed Kiara PV3 Facility and its associated infrastructure may have a visual impact on the study area, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility.

Overall, the significance of the visual impacts is expected to range from moderate to low as a result of the generally undeveloped character of the landscape and the remote location of the project infrastructure. There are a very limited number of potential sensitive visual receptors within a 3km radius of the proposed PV3 structures (ie. five (5) homesteads have been described), although the possibility does exist for visitors to the region to venture into closer proximity to the PV facility structures. These observers may consider visual exposure to this type of infrastructure to be intrusive.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the PV facility and associated infrastructure would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

10.2.6 Impact on the Social Environment

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

From a social perspective, it is concluded that the project is supported, but that mitigation measures should be implemented and adhered to. Positive and negative social impacts have been identified. The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws, and which are of such significance that they cannot be successfully mitigated. Positive impacts could

be enhanced by implementing appropriate enhancement measures and through careful planning. Based on the social assessment, the following general conclusions and findings can be made:

» The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focused on the construction of PV facilities and pivot infrastructure (these relate to intrusion and disturbance impacts, safety and security) and could be reduced with the implementation of the mitigation measures proposed.
» Employment opportunities will be created in the construction and operation phases and the impact is rated as positive even if only a small number of individuals will benefit in this regard.
» The proposed project could assist the local economy in creating entrepreneurial development, especially if local businesses could be involved in the provision of general material and services during the construction and operational phases.
» Capacity building and skills training amongst employees are critical and would be highly beneficial to those involved, especially if they receive portable skills to enable them to also find work elsewhere and in other sectors.
» The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society.

The following recommendations are made based on the Social Impact Assessment which included a stakeholder engagement process. The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts. Based on the social assessment, the following recommendations are made:

» In terms of employment related impacts, it is important to consider that job opportunities for the unskilled and semi-skilled are scarce commodities in the study area and could create competition among the local unemployed. Introducing an outside workforce will therefore most likely worsen local endeavours to obtain jobs and provoke discontent as well as put pressure on the local services available. Local labour should be utilised to enhance the positive impact of employment creation in the area. Local businesses should be involved with the construction activities where possible. It is imperative that local labour be sourced to ensure that benefits accrue to the local communities. Preference should thus be given to the use of local labour during the construction and operational phases of the project as far as possible.
» Locals should also be allowed an opportunity to be included in a list of possible local suppliers and service providers, enhancing the multiplier effect. This aspect would serve to mitigate other subsequent negative impacts such as those associated with the inflow of outsiders to the area, the increased pressure on the infrastructure and services in the area, as well as the safety and security concerns.
» Impacts associated with the construction period should be carefully mitigated to minimise any dust and noise pollution.
» Safety and security concerns should be considered during the planning and construction phases of the proposed project.

The proposed project and associated infrastructure will create a number of potential socio-economic opportunities and benefits and is unlikely to result in permanent damaging social impacts. From the specialist's perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project.

Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that the project can be authorised from a social perspective.

10.2.7 Assessment of Cumulative Impacts

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

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

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes, aquatic systems) due to the development of Kiara PV3 Facility and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of Kiara PV3 Facility and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.
- Change to the sense of place and character of the area is expected with the development of the proposed Kiara PV3 Facility and other renewable energy facilities within a 30km radius of the site. The cumulative impact is however considered to be acceptable provided best practice management measures are implemented.
- There will be no unacceptable loss of heritage resources associated with the development of Kiara PV3 Facility. The cumulative impact is therefore acceptable.
- No unacceptable negative social impacts are expected to occur. Positive cumulative impacts are expected to occur from a social perspective as a result of local economic upliftment and employment opportunities. Positive cumulative impacts are expected to be beneficial at a regional level. The cumulative impact is therefore acceptable.

Based on the specialist cumulative assessment and findings, the development of the Kiara PV3 Facility and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that the Kiara PV3 Facility cumulative impacts will be mainly of a medium to low significance, with impacts of a high significance mainly relating to terrestrial biodiversity impacts. Therefore, the development of the Kiara PV3 Facility will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

Environmental Sensitivity

Taking into consideration the solar resource, proximity to the off-taker and point of interconnection, 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 Project within the Development Footprint is considered to be desirable. The Development Footprint within which the facility is

proposed is sufficient in extent for the installation of a solar PV facility, while allowing for the avoidance of environmental site sensitivities. Similarly, the power line corridor identified is sufficient for the placement of the power line while allowing for the avoidance of environmental sensitivities. To ensure avoidance of these sensitive environmental features, the facility layout has been optimised by the Project Developer. This approach ensures the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate and offset) to the Kiara PV3 Facility project, which ultimately ensures the avoidance, reduction and/or mitigation of all identified detrimental or adverse impacts on sensitive features as far as possible.

In summary the Environmental sensitivities identified include:

» Marico Biosphere Reserve borders the study area to the north

Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the Development Footprint proposed by the Project Developer, the avoidance of the sensitive environmental features within the Development Footprint, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the Project is acceptable within the landscape and can reasonably be authorised subject to avoidance of the sensitive areas identified through the EIA process and the implementation of recommended mitigation measures.

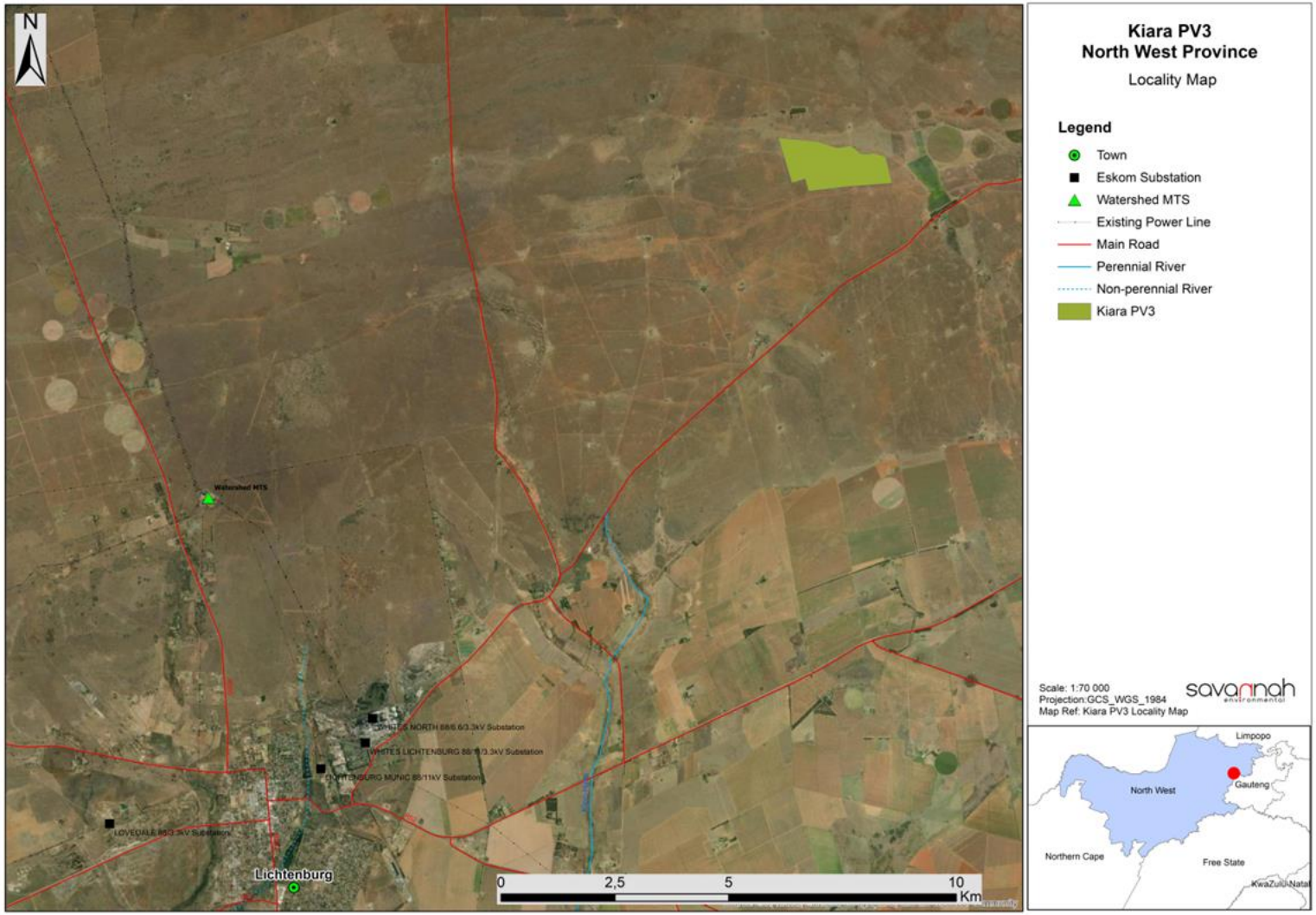

Figure 1.: Locality map illustrating the location of the Kiara PV3 Facility development area

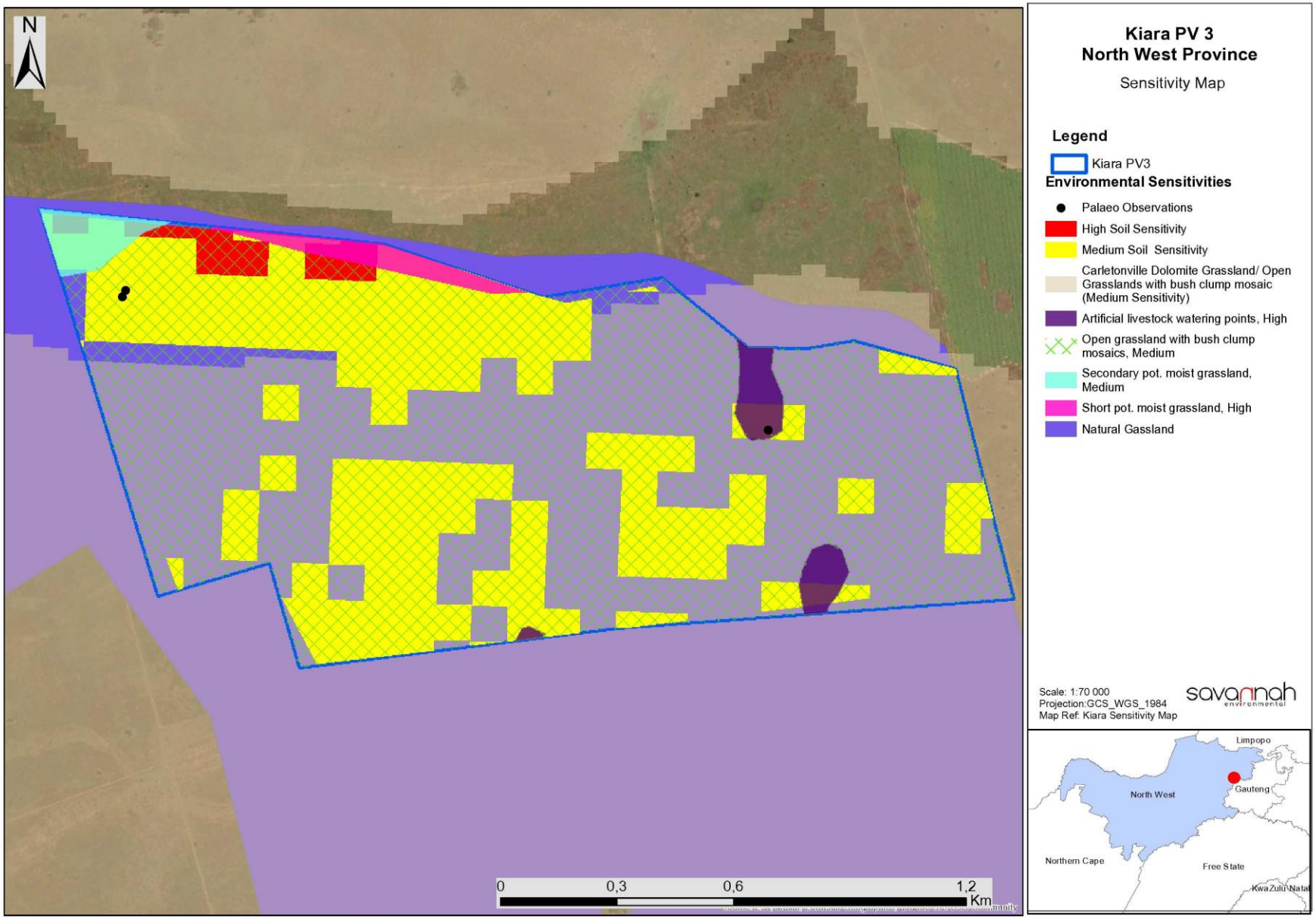

Figure 2: Sensitivity map of the preferred development footprint for the Kiara PV3 Facility

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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).

Rotor: The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at a constant speed of about 15 to 28 revolutions per minute (rpm).

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

ACRONYMS

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fisheries, and the Environment (National)
DWS	Department of Water and Sanitation
CBA	Critical Biodiversity Area
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DM	District Municipality
DMRE	Department of Mineral Resources Energy
EAP	Environmental Assessment Practitioner
EGIS	Environmental Geographic Information System
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
ESA	Ecological Support Area
GA	General Authorisation
GHG	Greenhouse Gas
HGM	Hydrogeomorphic
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
m	Metre
m^2	Square meters
m^3	Cubic meters
m amsl	Metres Above Mean Sea Level
MW	Megawatts
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)
NEM:WA	National Environmental Management: Waste Act (No. 59 of 2008)

NFA	National Forests Act (No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (No. 25 of 1999)
NT	Near Threatened
NWA	National Water Act (No. 36 of 1998)
NWDEDECT	North West Department of Economic Development, Environment, Conservation and Tourism
ONA	Other Natural Area
PA	Protected Area
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
TOPS	Threatened or Protected Species
VU	Vulnerable

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CHAPTER 1: INTRODUCTION

Voltalia South Africa (Pty) Ltd is proposing the development of a commercial photovoltaic (PV) solar energy facility and associated infrastructure on a site located approximately 16km north-east of the town of Lichtenburg, within the Ditsobotla Local Municipality and the Ngaka Modiri Molema District Municipality in the North West Province (refer to **Figure 1.1**). The facility will have a contracted capacity of up to 120MW and will be known as the Kiara PV3 Facility. The project is planned as part of a larger cluster of renewable energy projects, which include six (6) additional PV facilities, each up to 130MW (known as the Kiara PV3, Kiara PV2, Kiara PV3, Kiara PV5 and Kiara PV6, and Kiara PV7) and grid connection infrastructure connecting the facilities to the existing Watershed Substation (refer to **Figure 1.2**). These projects are proposed by separate Specialist Purpose Vehicles (SPVs)[2], and are assessed through separate Environmental Impact Assessment (EIA) processes.

The Kiara PV3 Facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid the Kiara PV3 Facility under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or similar programme, with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP), with the Kiara PV3 Facility set to inject up to 120MW into the national grid.

From a regional perspective, the North West Province, and particularly the area under investigation, is considered favourable for the development of a commercial solar facility by virtue of prevailing climatic conditions, relief, the extent of the affected properties, the availability of a direct grid connection (i.e., a point of connection of the national grid) and the availability of land on which the development can take place.

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

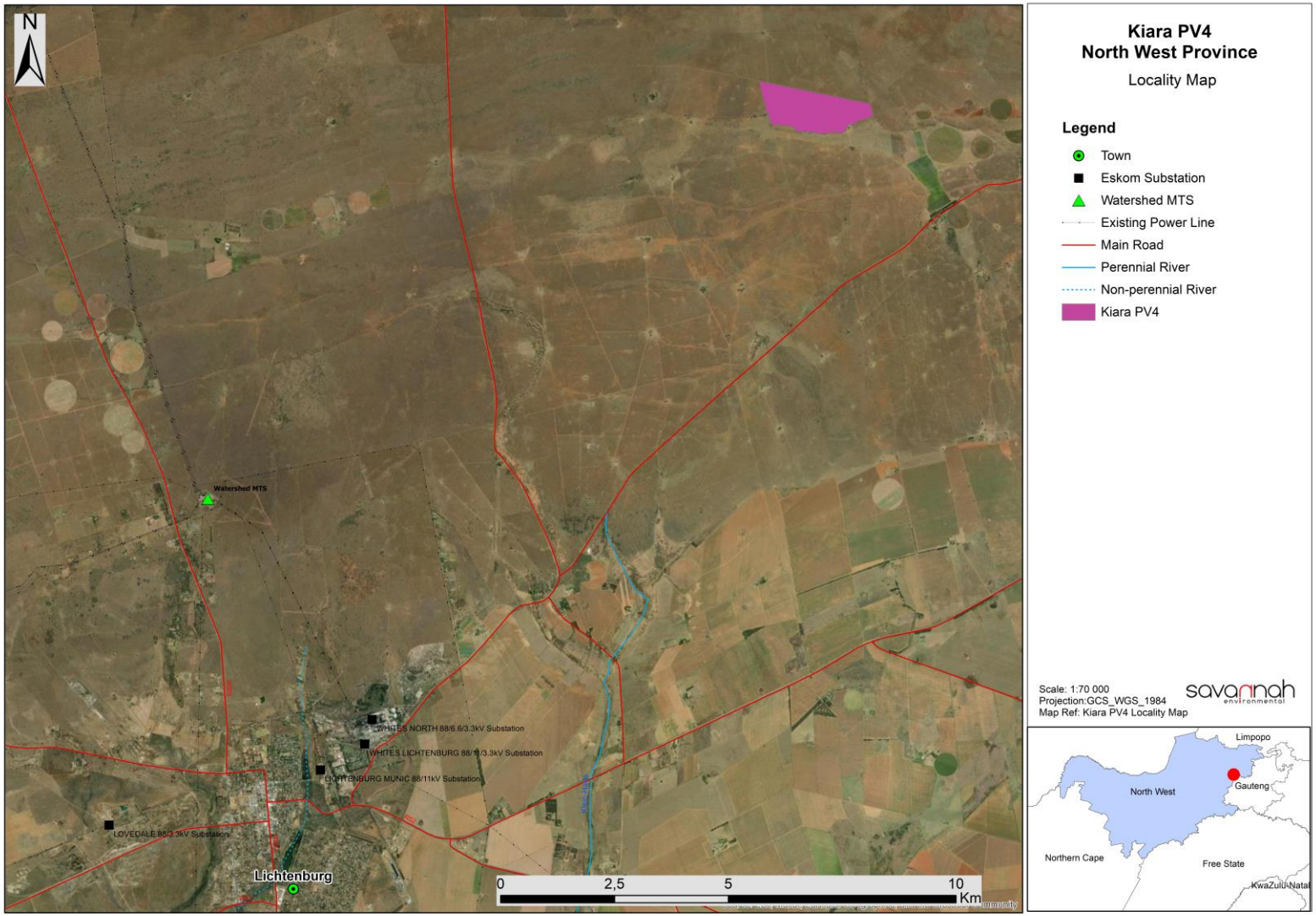


Figure 1.1: Locality map illustrating the location of the Kiara PV3 Facility project site in relation to the nearest town Lichtenburg

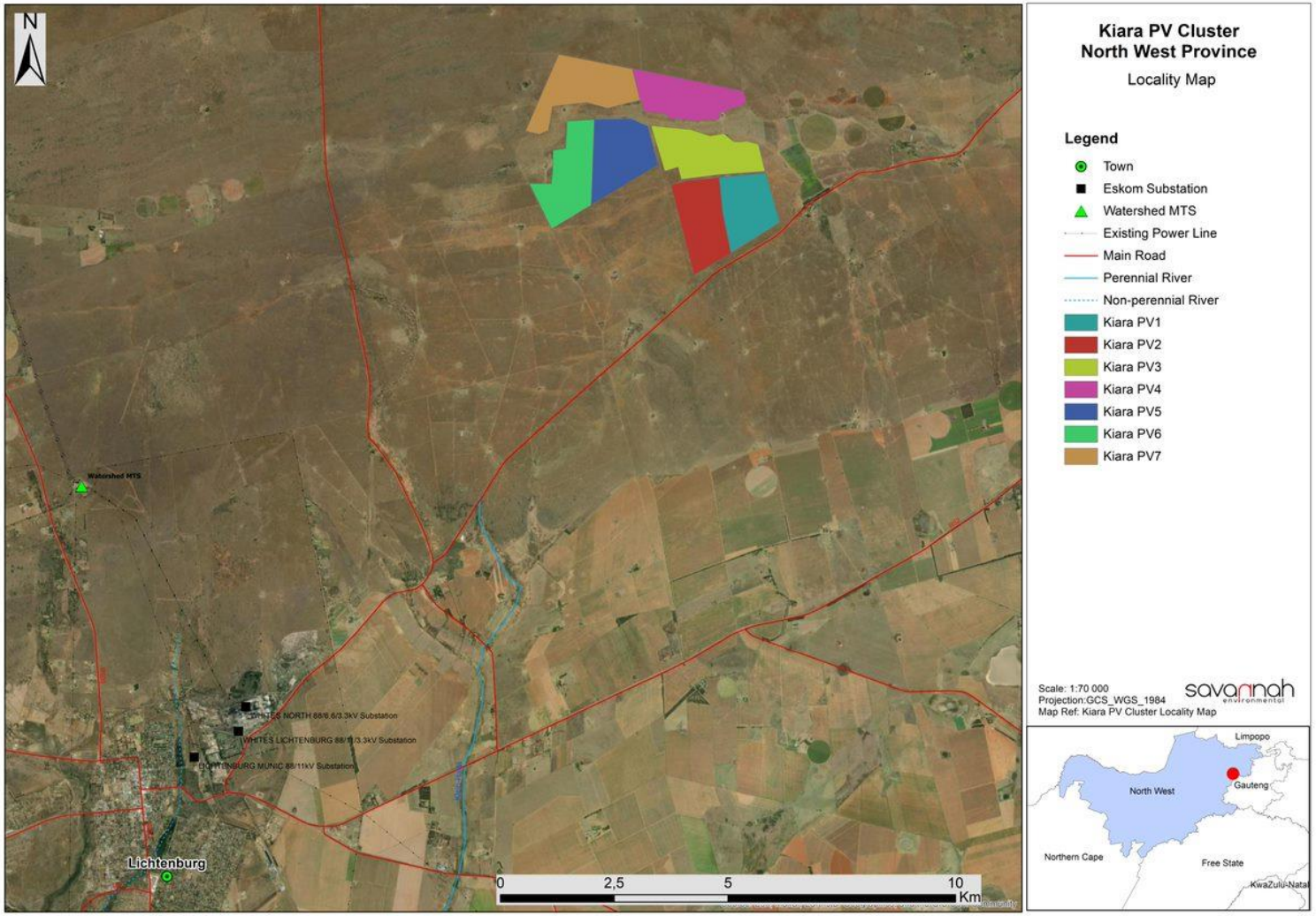


Figure 1.2: Locality map illustrating the cluster of proposed renewable energy facilities that the Kiara PV3 Facility forms part of

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

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

Requirement	Relevant Section
(3)(a)(i) the details of the EAP who prepared the report and (ii) the expertise of the EAP to carry out EIA procedures; including a curriculum vitae	The details of the EAP and the expertise of the EAP have been included in **Section 1.5**. The Curriculum vitae of the Savannah Environmental team have been included as **Appendix A**.
3(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	Details of the location of the Project, the affected properties, including the property names and numbers, as well as the SG-codes are included in **Table 1.1**.
3(v) a map at an appropriate scale of the property on which the activity is to be undertaken clearly indicating the location of the activity on the property or properties	A locality map illustrating the location of the Project has been included in **Figure 1.1**. The centre point co-ordinates of the project site are included in **Table 1.1**.

This EIA Report consists of eleven (11) chapters, which include:

- **Chapter 1** provides background to the Kiara PV3 Facility and associated infrastructure and the environmental impact assessment process.
- **Chapter 2** provides a description of the Kiara PV3 Facility and associated infrastructure and description of Solar PV as a power generation technology
- **Chapter 3** provides the site selection information and identified Kiara PV3 Facility and associated infrastructure alternatives.
- **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa
- **Chapter 5** outlines the need and desirability of the Kiara PV3 Facility and associated infrastructure.
- **Chapter 6** outlines the process which was followed during the EIA process.
- **Chapter 7** describes the existing biophysical and social environment within and surrounding the study and development area.
- **Chapter 8** provides an assessment of the potential the direct and indirect impacts associated with the proposed Kiara PV3 Facility and associated infrastructure.
- **Chapter 9** provides an assessment of cumulative impacts associated with the proposed Kiara PV3 Facility and associated infrastructure.
- **Chapter 10** presents the conclusions and recommendations of the EIA for the Kiara PV3 Facility and associated infrastructure.
- **Chapter 11** provides references used to compile the EIA Report.

1.2 Project Overview

The project site (~856.5ha in extent) has been identified by the applicant as a technically feasible site which has the potential for the development of the Kiara PV3 Facility, including a Battery Energy Storage System (BESS).

Infrastructure associated with the solar PV facility will include:

- PV modules and mounting structures
- Inverters and transformers
- Cabling between the panels.
- Cabling from the onsite substation to the collector substation (either underground or overhead).
- 132kV onsite facility substation.
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Temporary and permanent laydown area
- Grid connection solution will include:
    - Facility Substation
    - Eskom Switching Station
    - A 275kV powerline (16.6km in length) (either single or double circuit), to connect the PV facility to the Watershed MTS

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

Table 1.1: Detailed description of the project site.

Province	**North West Province**	
District Municipality	Ngaka Modiri Molema District Municipality	
Local Municipality	Ditsobotla Local Municipality	
Ward Number (s)	Ward 16	
Nearest town(s)	Lichtenburg (~16km south-east)	
Farm name(s) and number(s) of properties affected by the Solar PV Facility	Farm Hollaagte No. 8	
Farm Portion(s), Name(s) and Number(s) associated with the PV Facility	Portion 2 of the Farm Hollaagte No. 8	
SG 21 Digit Code (s) for all properties	T0IP00000000000800002	
Current zoning	Agricultural (grazing of cattle)	
Current land use	Grazing (mainly cattle)	
Site Extent (Study Area)	~ 856.5 ha	
PV Development Area	~195ha	
Site Coordinates (project site)	**Latitude:**	**Longitude:**

	26° 0'49.34"S	26°15'48.24"E
	26° 0'50.55"S	26°16'20.03"E
	26° 0'54.00"S	26°16'35.29"E
	26° 0'52.06"S	26°16'45.29"E
	26° 0'57.11"S	26°16'54.63"E
	26° 0'56.44"S	26°17'4.30"E
	26° 0'58.40"S	26°17'13.05"E
	26° 1'17.23"S	26°17'18.68"E
	26° 1'26.07"S	26°16'14.90"E
	26° 1'18.03"S	26°16'11.80"E
	26° 1'21.25"S	26°16'1.51"E

The overarching objective for the Kiara PV3 Facility is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and maintenance costs, as well as potential social and environmental impacts in accordance with the principles of sustainable development. The full extent of the development area was considered during the Scoping Phase through site-specific specialist studies 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 (~195ha), a development footprint or facility layout has been defined for assessment in the EIA Phase taking into consideration the environmental sensitivities or constraints identified through the scoping evaluation.

1.3 Overview of the Environmental Impact Assessment (EIA) Process

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

Various aspects of the Project are listed as activities that may have a detrimental impact on the environment. The primary listed activity triggered by the Project is Activity 1 of Listing Notice 2 (GN R325) which relates to the development of facilities or infrastructure for the generation of electricity from a renewable resource where the generating capacity is 20MW or more. The Project will have a contracted capacity of up 120MW. The application for authorisation for the project is therefore required to be supported by a full Scoping and Environmental Impact Assessment (S&EIA), as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326).

As the project has the potential to impact on the environment, an Environmental Authorisation (EA) is required from the Department of Forestry, Fisheries and the Environment (DFFE), the CA for the project, 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, as amended (GNR 326).

The need for EA subject to the completion of a full S&EIA is triggered by the inclusion of, amongst others, Activity 1 of Listing Notice 2 (GNR 325)[3], namely:

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

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 process 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 in order to identify and delineate any environmental fatal flaws, no-go and / or sensitive areas. Following a public review period of the Scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for the EIA to the CA for consideration 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 CA for final review and decision-making.

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

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), 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 specialist environmental consulting company providing a holistic environmental management service, including environmental assessment, and planning to ensure compliance and evaluate the risk of development, and the development and implementation of

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

environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.
The Savannah Environmental team for this project includes:

» **Nkhensani Masondo,** the principal author of this report and EAP on this project is registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA (2020/1385) and holds a BSocSci in Environmental Analysis and Management and is currently completing her MSc in Environmental Management. She has six (6) years of working experience in the environmental field and has gained extensive experience in conducting Environmental Impact Assessments, Stakeholder Engagements, Environmental Auditing and Environmental Management Plans Programmes for a wide range of projects. She is responsible for overall compilation of the report, this includes specialists' engagements, reviewing specialists reports and incorporating specialist studies into the Environmental Impact Assessment report and its associated Environmental Management.

» **Jo-Anne Thomas,** the project manager for the EIA process being undertaken for the proposed project. She is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726). 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.

» **Bregardia Rabbie** is a Public Participation Consultant at Savannah Environmental. She has 6 years working experience in project management and coordinating public participation processes in the Telecommunication industry. She has good communication skills and utilizes this skill to manage interaction between National, Provincial, and local authorities and the community. Bregardia is skilled at organising, managing, and coordinating public participation and engagement projects effectively and timeously.

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

1.5 Details of the Independent Specialist Team

In order to adequately 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 EIA Report (refer Table 1.2). CVs detailing the independent specialists' expertise and relevant experience are provided in **Appendix O**.

In order to adequately identify and assess potential environmental impacts associated with the proposed Kiara PV3 Facility, the following specialist consultants have provided input into this EIA report:

Company	Specialist Area of Expertise	Specialist Name
DPR Ecologists & Environmental Ecologists	Terrestrial Ecology	Darius van Rensburg
The Biodiversity Company	Avifauna	Leigh-Ann de Wet and Andrew Husted [4]
Terra Africa Environmental Consultants	Soils and Agricultural Potential	Mariné Pienaar
LOGIS	Visual	Lourens du Plessis
CTS Heritage	Heritage and Palaeontology	Jenna Lavin
Savannah Environmental & Dr Neville Bews & Associates.	Social environment	Nondumiso Bulunga and peer reviewed by Dr Neville Bews

[4]Pachnoda Consulting CC undertook the Avifaunal Assessment for the Scoping Phase, however, due to unforeseen circumstances they could not undertake the Avifaunal Assessment for the EIA Phase, therefore The Biodiversity Company has been appointed to complete the Avifaunal Assessment for the EIA Phase.

CHATER 2: PROJECT DESCRIPTION

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

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

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

Requirement	Relevant Section
3(i)(d) a description of the scope of the proposed activity, including: (ii) a description of the activities to be undertaken including associated structures and infrastructure	A description of the project and all associated infrastructure is included in **Table 2.1**. Activities to be undertaken during the various project development phases included in **Table 2.2**.

2.2 Nature and Extent of the Kiara PV3 Facility

In responding to the growing electricity demand within South Africa, the need to promote renewable energy and sustainability within the North West Province, as well as the country's targets for renewable energy, Voltalia South Africa (Pty) Ltd is proposing the development of a commercial solar farm and associated infrastructure to add new capacity to the national electricity grid. The Kiara PV3 Facility will be developed in a single phase and will have a contracted capacity of up to 120MW. The project will make use of fixed-tilt, single-axis tracking, and/or double-axis tracking PV technology. Monofacial or bifacial panels are both considered within this Scoping Report.

The Kiara PV3 Facility will comprise solar panels which, once installed, will stand less than 5m above ground level. The solar panels will include centralised inverter stations, or string inverters mounted above ground. If centralised inverter stations are used, Mega Volt (MV) distribution transformers are located internally, whereas string inverters are containerised with switchgear. The main transformer capacity varies according to detailed design and project-specific requirements.

2.3 Overview of the Project Site

The project is to be developed on a site located approximately 16km north-east of the town of Lichtenburg. The project site falls within Ward 16 of the Ditsobotla Local Municipality within the Ngaka Modiri Molema District. The full extent of the development area (i.e., ~ 195ha), located within the project site (i.e., ~ 856.5ha) was considered within the Scoping Phase of the EIA process, within which the Kiara PV3 Facility will be appropriately located from a technical and environmental sensitivity perspective. The development area includes the following affected property:

» Portion 2 of the Farm Hollaagte No. 8

The project site within which the PV facility is proposed is situated ~8km south-east to the R52 provincial road. Access to the project site is via the existing gravel road which branches off the R52 regional road on the southern side of the Kiara PV3 Facility development area (refer to **Figure 2.1**).

Figure 2.1: Location of the gravel road and the R52 regional road in relation to the Kiara PV3 Facility development area.

Considering environmentally constraining factors identified in the Scoping process, the layout of the PV facility and associated infrastructures has been determined.

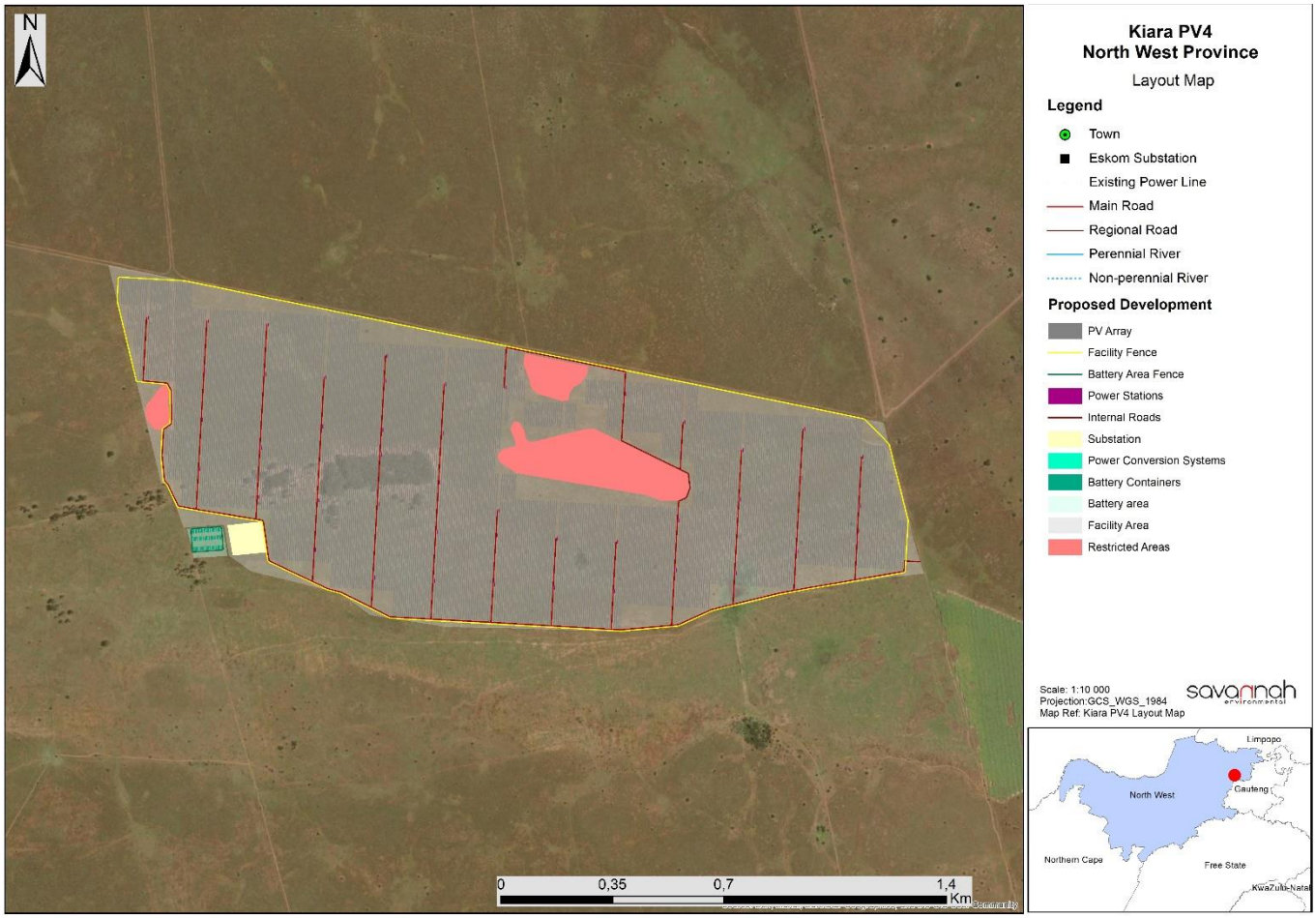


Figure 2.2: Kiara PV3 Layout plan

2.4 Components of the Kiara PV3 Facility

The facility will have a contracted capacity of up to 120MW and will include the following infrastructure:

- PV modules and mounting structures
- Inverters and transformers
- Cabling between the panels.
- Cabling from the onsite substation to the collector substation (either underground or overhead).
- 132kV onsite facility substation.
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Temporary and permanent laydown area
- Grid connection solution will include:
    - Facility Substation
    - Eskom Switching Station
    - A 275kV powerline (16.6km in length) (either single or double circuit), to connect the PV facility to the Watershed MTS

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

Table 2.1: Details or infrastructures proposed as part of Kiara PV3 Facility

Infrastructure	Footprint and dimensions
Number of Panels	~183 720
Panel Height	Up to 5m from ground level
Technology	Use of fixed-tilt, single-axis tracking, and/or double-axis tracking PV technology. Monofacial or bifacial panels are both considered.
Battery Energy Storage System (BESS)	BESS area: ~8m^2 Maximum Volume: 1740 m^3
Other infrastructures	Operations building – 20m x 10m = 200m^2 Workshop – 15m x 10m = 150m^2 Stores - 15m x 10m = 150m^2
Area occupied by laydown area	Temporary Laydown Area: 220m x 100m
Contracted Capacity	Up to 120MW
Area occupied by the solar array	195m^2
Area occupied by the substations	Facility substation: Up to 1ha Eskom switching station: Up to 3ha
Access and internal roads	Wherever possible, existing access roads will be utilised to access the project site and development area. It is unlikely that access roads will need to be upgraded as part of the proposed development. Main access road to the project site will be via the existing R52 gravel road. Internal access roads (gravel) of up to 6m in width will be required to access the PV facility.
Grid connection	The 33/132kV on-site substation will be connected to the proposed central collector substation via overhead/underground cabling with a capacity of up to 132kV. A new 275kV single- or double-circuit power line will run from the central collector substation and tie into the existing Watershed MTS. The switching station forming part of the 132kV collector substation and the new 275kV single-or double circuit power line will be assessed as part of a separate Environmental Impact Assessment process in support of an application for Environmental Authorisation.
Temporary infrastructure	Temporary infrastructure, including laydown areas, hardstand areas and a concrete batching plant, will be required during the construction phase. All areas affected by temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.

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

Table 2.2 provides the details of Kiara PV3 facility, including the main infrastructure components and services that will be required during the project life cycle.

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

Construction Phase	
Requirements	» Project receives Environmental Authorisation from the DFFE, preferred bidder allocation granted by DMRE (or other off-taker), a generating license issued by NERSA, and a Power Purchase Agreement secured with Eskom (or private entity). » Construction Phase is expected to be 15-18 months for Kiara PV3 Facility. » Create direct construction employment opportunities. Approximately 200 employment opportunities will be created. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Lichtenburg 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 generated by a generator. Where low voltage connections are possible, these will be considered. » Water required for the construction phase will be supplied by the municipality. In addition, where possible, borehole water will be used. 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	» Including, but not limited to: a geotechnical survey, site survey and confirmation of the panel micro-siting footprint, and survey of the on-site substation site to determine and confirm the locations of all associated infrastructure.
Establishment of access roads to the Site	» 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. » Internal service road alignment will be approximately 8m wide. Location is to be determined by the final micro-siting or positioning of the PV panels.
Undertake site preparation	» 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	» 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	» Excavations to be undertaken mechanically. » For PV array installation vertical support posts will be driven into the ground. » Depending on geological conditions, the use of alternative foundations may be considered (e.g., screw pile, helical pile, micropile or drilled post/piles).
Transport of components and equipment to and within the site	» The components for the solar PV 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, Inverters and BESS	» The construction phase involves installation of the solar PV panels and the structural and electrical infrastructure to make the plant operational. In addition, preparation of the soil and improvement of the access roads would continue for most of the construction phase. » For array installation, typically vertical support posts are driven into the ground. Depending on the results of the geotechnical 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. » Wire harnesses connect the PV modules to the electrical collection systems. » Underground cables and overhead circuits connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure and ultimately the project's on-site substation. This process also involves the installation of the BESS facility.
Connection of PV panels to the onsite substation	» PV arrays to be connected to the on-site substation via underground electrical cables. » Excavation of trenches is required for the installation of the cables. Trenches will be approximately 1.5m deep. » Underground cables are planned to follow the internal access roads, as far as possible. » Onsite substation to be connected to the collector substation via underground cables.

Establishment of ancillary infrastructure	» 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	» A new 275kV single- or double-circuit power line will run from the central collector substation and tie into the existing Eskom Watershed Substation.
Undertake site rehabilitation	» 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	» Duration will be 20-25 years. » Requirements for security and maintenance of the project. » Employment opportunities relating mainly to operation activities and maintenance. Approximately 15 - 20 full-time employment opportunities will be available during the operation of the solar facility.
Activities to be undertaken	
Operation and Maintenance	» 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 using 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	» Decommissioning of the Kiara PV3 Facility infrastructure at the end of its economic life. » Potential for repowering of the facility, depending on the condition of the facility at the time. » Expected lifespan of approximately 20 - 25 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	» 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.

Disassemble and remove PV panels	» Components to be reused, recycled, or disposed of in accordance with regulatory requirements. » Much of the above ground wire, steel, and PV panels of which the system is comprised are recyclable materials and would be recycled to the extent feasible. » Concrete will be removed to a depth as defined by an agricultural specialist and the area rehabilitated. Cables will be excavated and removed, as may be required
Post-decommissioning land use	» Following decommissioning of the facility, the project site will be returned to the current land use (i.e. agriculture)

2.5 Technology considered for the Solar Energy Facility and the Generation of Electricity

The Project will have a contracted capacity of up to 120MW and will make use of PV technology. Solar energy facilities, such as those which utilise PV technology use the energy from the sun to generate electricity through a process known as the **Photovoltaic Effect**. Generating electricity using the Photovoltaic Effect is achieved through the use of the following components:

Photovoltaic Modules

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

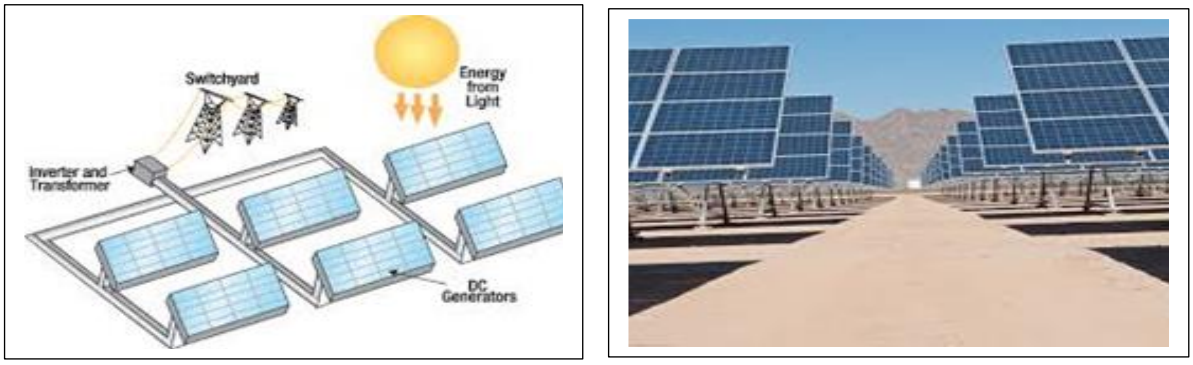


Figure 2.3: Overview of a PV cell, module and array / panel (Source: pveducation.com).

Inverters

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

Support Structures

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

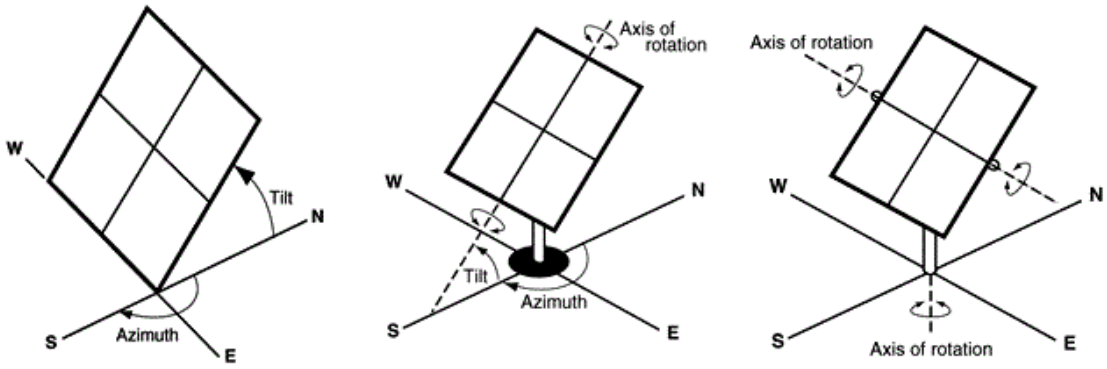


Figure 2.4: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com).

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

Bifacial Solar Panel 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 4.3). Practically speaking, this means that a bifacial solar panel can absorb light reflected off the ground or another material. In general, more power can be generated from bifacial modules for the same area, without having to increase the development footprint.

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

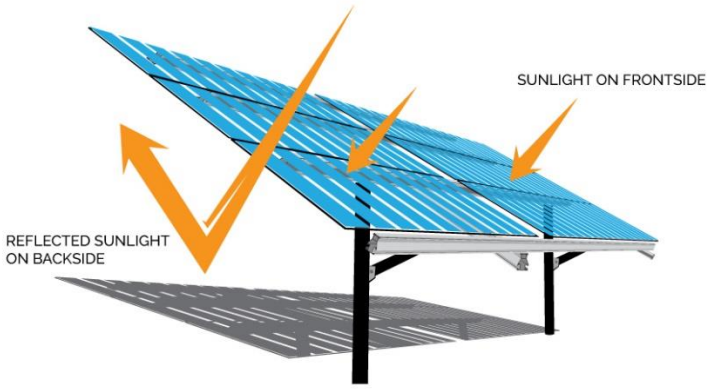


Figure 2.5: Diagram showing how bifacial Solar PV panels work (Source: https://sinovoltaics.com/learning-center/solar-cells/bifacial-solar-modules/)

Figure 2.6 below illustrates a typical PV facility, including installation.

Figure 2.6: Photographs of the construction phase of a solar facility similar to those proposed (Source:https://medium.com/@solar.dao/how-to-build-pv-solar-plant-6c9f6a01020f; https://www.shutterstock.com/video/clip-1028794-workers-mounting-panels-on-solar-power-plant-construction; https://www.esi-africa.com/renewable-energy/kenya-construction-solar-farm-gets-green-light/).

Battery Energy Storage System (BESS)

The need for a BESS stems from the fact that electricity is only produced by the Renewable Energy Facility while the sun is shining, while the peak demand may not necessarily occur during the daytime. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, reliable and electricity supply more constant.

The BESS will:

- Store and integrate a greater amount of renewable energy from the Solar PV Facilities into the electricity grid;
- This will assist with the objective to generate electricity by means of renewable energy to feed into the National Grid which will be procured under either the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), other government run procurement Programmes or for sale to private entities if required.
- Proposed preferred technology to be used: Three main technologies to be considered, either separately or in combination:
  - Lithium-ion batteries (LFP/NMC or others) (Li-Ion)
  - Lithium capacitors/Electrochemical capacitors (LiC)
  - Redox-flow batteries (RFB)

Figure 2.7 below illustrates a typical utility scale BESS system (a Lithium-Ion BESS).

Figure 2.7: Li-Ion BESS containerised modules located within the BESS enclosure footprint (Source: Tesla).

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for the Kiara PV3 Facility as part of the Scoping & EIA Process.

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

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

Requirement	Relevant Section
3(1)(h)(i) details of the development footprint alternatives considered	The details of the alternatives considered as part of the Kiara PV3 Facility and as part of the EIA Process have been included in **Section 3.2**.
3(1)(h)(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such.	The details of the alternatives considered as part of the Kiara PV3 Facility and as part of the EIA Phase have been included in **Section 3.3.** Where no alternatives are being considered a motivation has been included.
3(1)(h)(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	A concluding statement indicating the location of the preferred alternative development footprint has been included in **Section 3.3.**

3.2 Alternatives Considered during the EIA Process

In accordance with the requirements of Appendix 3 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), reasonable and feasible alternatives including but not limited to site and technology alternatives, as well as the "do-nothing" alternative should be considered.

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

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

In this instance, 'the project' refers to Kiara PV3 Facility, a solar energy facility with capacity of up to 120MW and associated infrastructure proposed to be developed by an Independent Power Producer (IPP) and intended to form part of the DMRE's REIPPP Programme, or another similar programme.

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 particular relevance to the proposed project is the allocation of 6000MW of new capacity to large scale PV included in the IRP 2019.

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 as part of the country's energy mix has been defined. Therefore, fundamentally different alternatives to the proposed project are not considered within this S&EIA process.

3.2.2 Consideration of Incrementally Different Alternatives

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

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

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

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

3.3 Project Alternatives under Consideration for the Kiara PV3 Facility

3.3.1. Property or Location Alternatives

The proposed site for the Kiara PV3 Facility is located north-east of the town Lichtenburg. The preferred project site for the development of the Kiara PV3 Facility was identified through an investigation of prospective sites and properties in the area within the North West Province. The investigation involved the consideration of specific characteristics within the province and specifically within the areas near Lichtenburg including:

- Solar resource characteristics (including Global Horizontal Irradiation (GHI));
- Land availability;
- Land use and geographical and topographical considerations;
- Access to the national grid, including distance and capacity to connect the proposed project to the network;

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

» Site accessibility; and

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. 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 in an area. The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Global Horizon Irradiation (GHI) for the study area is in the region of approximately 2143 kWh/m^2/annum (refer to **Figure 3.1**). The North West Province is considered to have high solar irradiation values which therefore enables the development of solar energy projects and the successful operation thereof. Voltalia South Africa (Pty) Ltd has also confirmed the solar resource of the site through projections. Based on the solar resource available, no alternative locations are considered.

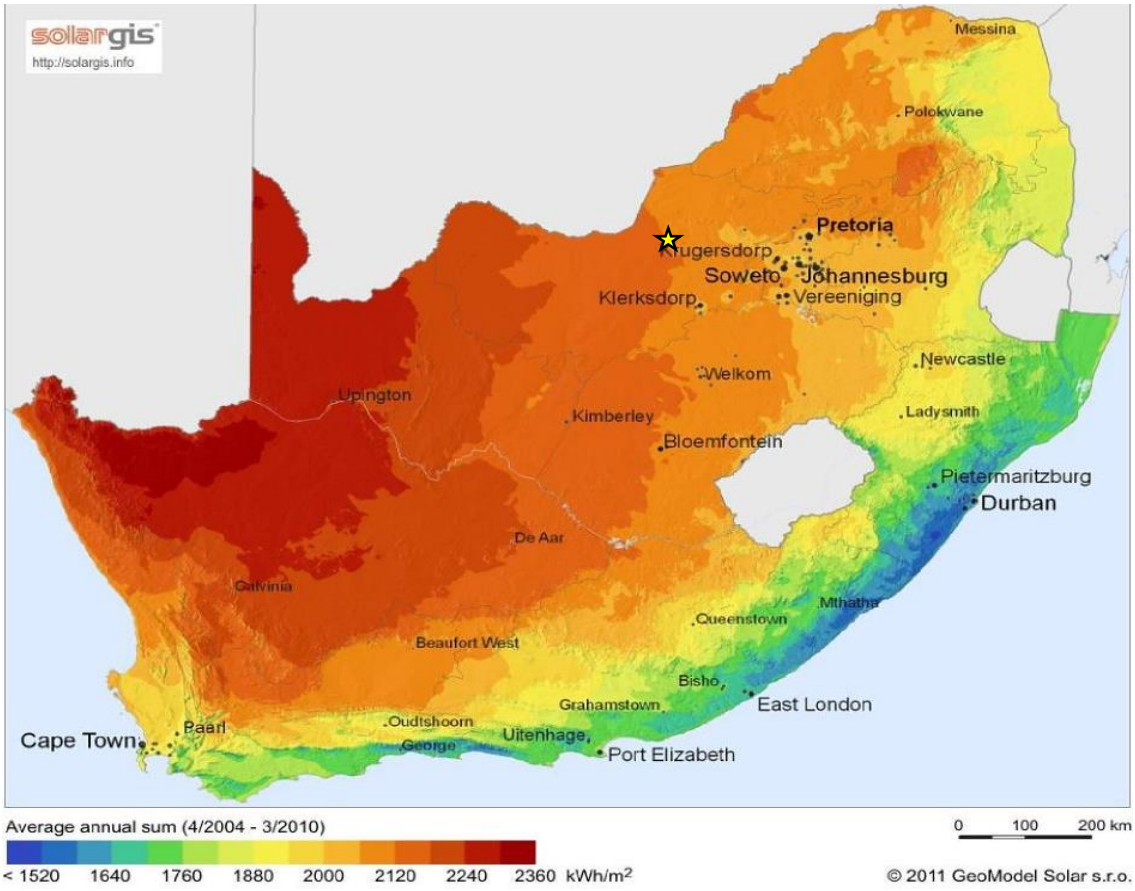


Figure 3.1: Solar irradiation map for South Africa; the proposed Kiara PV3 Facility position is shown by the yellow star on the map. (Source: adapted from GeoModel Solar, 2011).

» **Land availability**: In order to develop the Kiara PV3 Facility with a contracted capacity of up to 120MW, sufficient space is required. The properties included in the project site are privately-owned parcels available in the area, are available for a development of this nature through agreement with the landowners and are deemed technically feasible by the project developer for such development to

take place. The combination of the affected properties has an extent of ~856.5ha, which was considered by the developer as sufficient for the development of the Kiara PV3 Facility. A preferred development area of ~195ha within this larger project site has been identified for the location of the PV facility. An exact development footprint within the development area for the placement of infrastructure has been identified and assessed as part of the EIA Phase considering environmental constraints and sensitivities.

» **Landowner Support:** The selection of a site where the landowner is supportive of the development of renewable energy, and specifically solar PV, is essential for ensuring the success of the project. The landowner affected by the proposed Kiara PV3 Facility does not view the development as a conflict with their current land use practices. The support from the landowner for the development to be undertaken on the affected properties has been solidified by the provision of consent for the project to proceed on the property through the signing of consent forms and conclusion of a preliminary lease agreement with the developer.

» **Land suitability and land use activities**: The current land use of the development area is an important consideration in site selection in terms of limiting disruption to existing land use practices. The project site is currently used for grazing, which is generally preferred for developments of this nature as the grazing activities can continue on the project site in tandem with the operation of the solar PV facility. There is no cultivated agricultural land on the project site or directly adjacent to it which could be impacted upon by the proposed development. The proposed development is therefore considered to be compatible with the surrounding land uses and does not present a conflicting land use.

» **Geographical and Topographical Considerations:** Sites that facilitate easy construction conditions, (i.e. relatively flat topography, lack of major rock outcrops, limited watercourse crossings, etc.) are favoured by developers during the site selection process. As a result, the topography of the project area considered for the Kiara PV3 Facility is described as plains and pans or slightly undulating plains of no more than 5m in the central interior plain and it is characterised by an extremely even (flat) slope. These characteristics are preferred for the development of a solar PV facility as construction efforts and costs are minimised, and therefore the study area is considered to be preferable and acceptable for the development of the PV facility.

» **Access to the National Electricity Grid**: A key factor in the siting of any power generation project is a viable grid connection. The anticipated grid connection solution (subject to a separate environmental assessment and authorisation process) is a 132kV central collector substation and a power line up to 275kV to enable connection to the existing Watershed Substation. The existing Watershed Substation, located to the south-west of the site was identified as the preferred grid connection point for the project.

» **Site access**: Access to the project site is ample with the presence of existing roads mainly consisting of regional roads. The project site is situated ~8km south east to the R52 provincial road. Access to the project site is via the existing gravel road which branches off the R52 regional road on the southern side of the Kiara PV3 Facility development area.

Based on the above considerations, the Kiara PV3 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/location alternatives are proposed as part of this Scoping and EIA process.

3.3.2. Design and Layout Alternatives

A dedicated development area of approximately 195ha has been considered for the Kiara PV3 Solar Facility. Findings from specialist assessments and field surveys undertaken were considered through this Scoping & EIA process in order to provide site specific information regarding the project development areas considered for the Project.

Areas to be avoided that were identified during the scoping phase and present within the project site have been considered by developer to identify and locate the development area for the 120MW Kiara PV3 Facility. This has been 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, and thereby ensuring that the layout plan taken forward for assessment during the EIA Phase is considered to the most optimal from an environmental perspective. The facility layout assessed in this EIA Report is provided in Chapter 2.

The layout optimisation process applied by the developer as detailed above demonstrates due consideration of the suitability of the project site for the project in line with a typical mitigation hierarchy:

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

As part of the process, as described above, the first tier of avoidance has already been applied. No feasible alternative layouts have been identified for investigation as part of the EIA process.

3.3.3. Activity Alternatives

Voltalia South Africa (Pty) Ltd is a renewable energy project developer and as such is only considering renewable energy activities in accordance with the need for such development as identified within the IRP. The only activity considered for implementation on the identified site is therefore power generation using renewable energy resources.

Considering the available natural energy resources within the area (i.e., solar irradiation) and the current significant restrictions placed on other natural resources such as water, it is considered that solar energy is the preferred option for the development of a renewable energy facility within the preferred project site.

The project site is located near the town of Lichtenburg in the North West Province which has the Global Horizon Irradiation (GHI) of approximately 2130 kWh/m^2/annum. Based on available information, it is concluded that the project site is considered best suited for the development of a solar PV facility. Considering the suitability of the project site for the development of a solar PV facility, the current land-use

activities being undertaken within the project site which relate to livestock farming and compatibility thereof, the activity (i.e., the development of a solar PV facility) is considered to be appropriate. Therefore, no activity alternatives are considered within this Scoping Report.

3.3.4. Technology Alternatives

Few technology options are available for solar facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail in the area, so that optimality is obtained by the final site selection. Solar energy is considered to be the most suitable renewable energy technology for this area, based on the site location, ambient conditions and energy resource availability.

The Integrated Resource Plan (IRP) 2019, excludes the procurement of power from CSP facilities until 2030; whereas new additional capacity of approximately 6 000MW will be required from solar PV facilities. Therefore, PV technology was identified as being the preferred option for the study area. Solar PV consists of a lower visual profile and limited water requirements when compared to the CSP technology option. Therefore, considering the above, no other technology alternatives are being assessed for development on the proposed site.

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

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

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

The PV panels are designed to operate continuously for more than 20 to 25 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, Voltalia South Africa (Pty) Ltd will consider various solar panel options. The preferred option will be informed by efficiency as well as environmental impact and constraints (such as sensitive biophysical features). The PV panels proposed, will comprise solar panels which once installed, will stand less than 5m above ground level. The solar panels will include centralised inverter stations, or string inverters mounted above ground. The Battery Energy Storage System (BESS) capacity will depend on technology to be used and total installed capacity of solar, and it is expected to be in the order of 200-600 MW to 200-800 MWh.

3.3.5. The 'Do-Nothing' Alternative

The 'Do-Nothing' alternative is the option of not constructing Kiara PV3 Facility. Should this alternative be selected, there would be no environmental impacts or benefits as a result of construction and operation activities associated with a solar PV facility. The 'do-nothing' alternative will therefore likely result in minimising the cumulative impact on the land, although it is expected that pressure to develop the site for renewable energy purposes will be actively pursued due to the same factors which make the site a viable option for renewable energy development. This alternative is assessed in detail in Chapter 8 of this EIA Report.

CHAPTER 4: POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policy and legislative context within which the development of a Solar PV facility, such as Kiara PV3 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 an Impact Assessment Report

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

Requirement	Relevant Section
3(1)(e) a description of the policy and legislative context within which the development is 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, as a whole, 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 Kiara PV3 Facility is proposed is included in **sections 4.3, 4.4, 4.5** and **4.6.**

4.2 Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Mineral Resources and Energy (DMRE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as a solar energy facility is illustrated in **Figure 4.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of Kiara PV3 Facility.

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

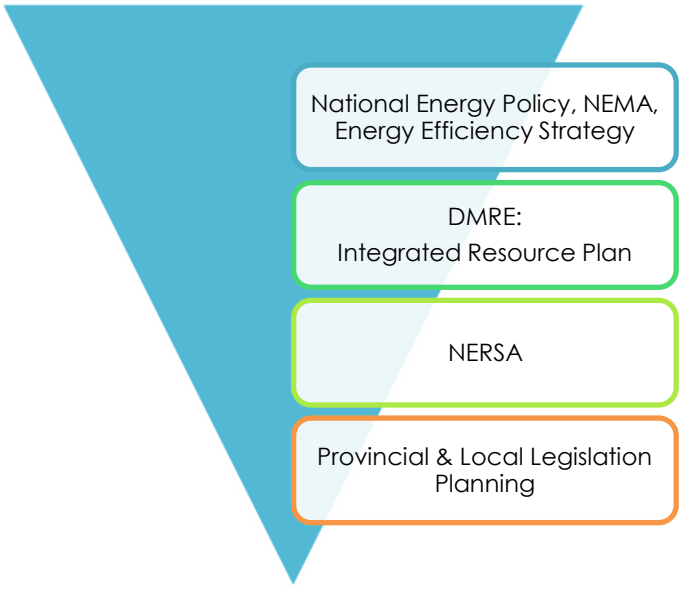


Figure 4.1: Hierarchy of electricity and planning documents

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

- **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity. Furthermore, the Department is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. Therefore, in terms of the Act, approval from the Minister is required to ensure that proposed activities do not sterilise mineral resources that may occur within the project site and development area.
- **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
- **Department of Forestry, Fisheries and the Environment (DFFE):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GN R326) as amended. DEA is the Competent Authority for this project (as per GN R779 of 01 July 2016) and is charged with granting the EA for the project under consideration.
- **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation).
- **The Department of Agriculture, Rural Development and Land Reform (DARDLR):** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).

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

- **Provincial Government of the North West – North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT):** This Department is the commenting authority for the EIA process for the project and is responsible for issuing of biodiversity and conservation-related permits. DEDECT's involvement relates specifically to sustainable resource management, conservation of protected species and land care.
- **North West Department of Public Works and Roads (NW DPWR):** NW DPWR is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- **North West Provincial Heritage Resources Agency (NW PHRA):** NW PHRA, the North West Provincial Heritage Resources Authority is responsible for the identification, conservation and management of heritage resources, as well as commenting on heritage related issues within the province.
- **North West Department of Community Safety and Transport Management (NW DCSTM):** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.

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 North West Province, both the local and district municipalities play a role. The local municipality includes the **Ditsobotla Local Municipality** which forms part of the **Ngaka Modiri Molema District Municipality**. In terms of the Municipal Systems Act (No. 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

5.3 International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of the Kiara PV3 Facility are provided below in **Table 4.1**. The Kiara PV3 Facility is considered to be aligned with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.1: International policies relevant to the Kiara PV3 Facility

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

Relevant policy	Relevance to the Kiara PV3 Facility
	The Paris Agreement sets 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 Glasgow with all countries agreeing the Glasgow Climate Pact to keep 1.5˚C alive and finalise the outstanding elements of the Paris Agreement. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for the Kiara PV3 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.
The Equator Principles IV (October 2020)	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 Kiara PV3 Facility) and apply globally to all industry sectors. Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the Kiara PV3 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. The Kiara PV3 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.

Relevant policy	Relevance to the Kiara PV3 Facility
International Finance Corporation (IFC) Performance Standards and Environmental and Social Sustainability (January 2012)	The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012. Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an Environmental and Social Management System (ESMS) appropriate to the nature and scale of the project, and commensurate with the level of its environmental and social risks and impacts, be established and maintained. The above-mentioned standard is the overarching standard to which all the other standards relate. Performance 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 all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS consistent with Performance Standard 1. Given the nature of the Kiara PV3 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.

4.4 National Policy and Planning Context

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

A brief review of the most relevant national policies is provided below in **Table 4.2**. The development of Kiara PV3 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 Kiara PV3 Facility

6 Bid windows1, 2 ,3 ,3.5 ,4 and small BW1(1S2) and small BW2(2S2). 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021. 860MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 5 in December 2022.

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

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

Relevant legislation or policy	Relevance to Kiara PV3 Facility
White Paper on the Energy Policy of the Republic of South Africa (1998)	The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of RE and encouraging new entries into the generation market. The policy states that the advantages of RE include, minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include higher capital costs in some cases, lower energy densities, and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	The White Paper on Renewable Energy Policy Supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of RE and aims to create the necessary conditions for the development and commercial implementation of RE technologies. The White Paper on RE sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing RE in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and accessible and affordable coal resources. However, massive RE resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The development of additional renewable energy projects will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix.
The Electricity Regulation Act (No. of 2006)	The Electricity Regulation Act of 2006, replaced the Electricity Act (No. 41 of 1987), as amended, except for Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator (NERSA) as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which the generation, transmission, distribution, trading, and import and export of electricity are regulated. Projects developed by IPPs which exceed 100MW in capacity are required to obtain a Generation License from the National Energy Regulator of South Africa (NERSA).
Integrated Energy Plan (IEP), 2016	The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include: » To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector. » To guide the selection of appropriate technologies to meet energy demand (i.e., the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels). » To guide investment in and the development of energy infrastructure in South Africa.

Relevant legislation or policy	Relevance to Kiara PV3 Facility
	» To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors. A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to take into account changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others. The 8 key objectives of the integrated energy planning process are as follows: » Objective 1: Ensure security of supply. » Objective 2: Minimise the cost of energy. » Objective 3: Promote the creation of jobs and localisation. » Objective 4: Minimise negative environmental impacts from the energy sector. » Objective 5: Promote the conservation of water. » Objective 6: Diversify supply sources and primary sources of energy. » Objective 7: Promote energy efficiency in the economy. » Objective 8: Increase access to modern energy.
Integrated Resource Plan for Electricity (IRP) 2010-2030	The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation. The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development. Since the promulgated IRP 2010–2030, the following capacity developments have taken place: » A total 6 422 MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3 876 MW operational and made available to the grid as of 31 March 2021[8] with 5 078MW from 79 IPP projects operational and made available to the grid[9]. » 2 000MW of generating capacity (comprising various technologies) has been awarded to 8 Independent Power Producers under the RMIPPPP in March 2021.

8 Bid windows1, 2 ,3, 3.5, 4 and small BW1(1S2) and small BW2(2S2). 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021. 860MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 5 in December 2022.

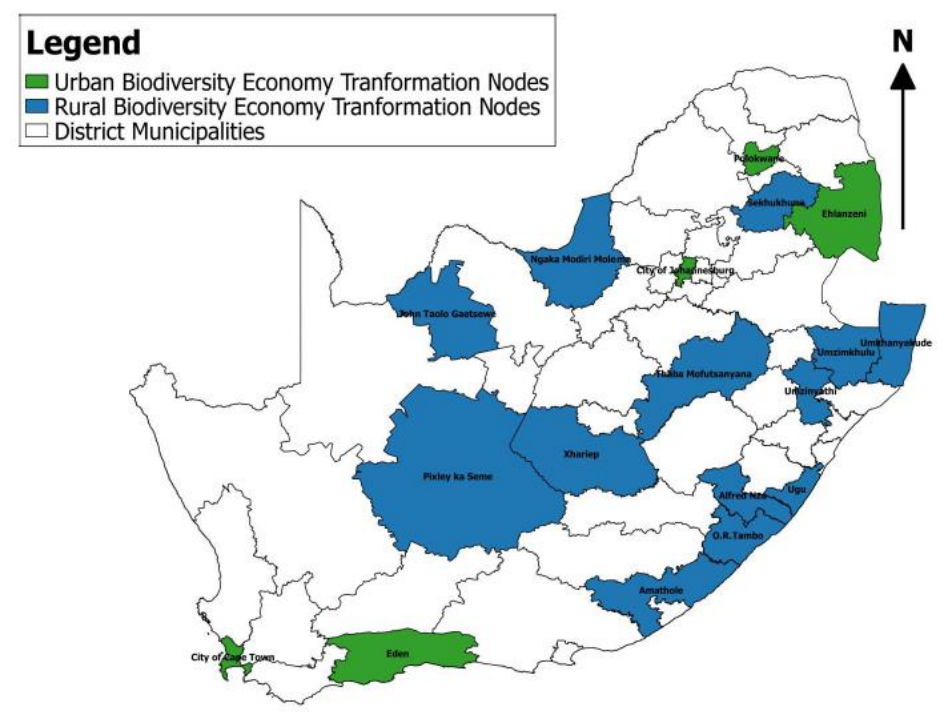
[9]https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html

Relevant legislation or policy	Relevance to Kiara PV3 Facility
	» 2 583MW of electricity in bid window 5 of the REIPPPP, announced on 28 October 2021 (DMRE, 2021). » IPPs have commissioned 1 005 MW from two Open Cycle Gas Turbine (OCGT) peaking plants. » Under the Eskom build programme, the following capacity has been commissioned: * 1 332 MW of Ingula pumped storage, 1 588 MW of Medupi, 800 MW of Kusile and * 100 MW of Sere Wind Farm. » 18 000MW of new generation capacity has been committed to. Besides capacity additions, a number of assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. In addition, environmental considerations such as South Africa's contribution to Greenhouse gases which contribute to climate change, local air quality and water availability have come to the fore. These considerations necessitated the review and update of the IRP and ultimately the promulgation of a revised plan in October 2019. In terms of the IRP 2019, South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. South Africa is a signatory to the Paris Agreement on Climate Change and has ratified the agreement. In line with INDCs (submitted to the UNFCCC in November 2016), South Africa's emissions are expected to peak, plateau and from year 2025 decline. Following consideration of all these factors, the following provision has been made for the following new capacity by 2030: » 1 500MW of coal; » 2 500MW of hydro; » 6 000MW of solar PV; » 14 400MW of wind; » 1 860MW of nuclear; » 2 088MW of storage; » 3 000MW of gas/diesel; and » 4 000MW from other distributed generation, co-generation, biomass and landfill technologies. Development of the Kiara PV3 Facility project would contribute towards the allocation for solar PV energy development.
New Growth Path (NGP) Framework, 23 November 2010	The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020; with economic growth and employment creation as the key indicators identified in the NGP. The framework seeks to identify key structural changes in the economy that can improve performance in terms of labour absorption and the composition and rate of growth.

Relevant legislation or policy	Relevance to Kiara PV3 Facility
	To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas.
National Development Plan 2030 (2012)	The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. In terms of the Energy Sectors role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes: » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at 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. In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system will look very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role. The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of Kiara PV3 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.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Commission (PICC) is integrating and phasing investment plans across 18 Strategic Integrated Projects (SIPs) which have 5 core functions, including to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. SIP 8 of the energy SIPs supports the development of RE projects as follows: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010) and supports bio-fuel production facilities. The development of Kiara PV3 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. The project could therefore be registered as a SIP project once it is selected as a Preferred Bidder project and is under development.
National Climate Change Response Policy, 2011	The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming

Relevant legislation or policy	Relevance to Kiara PV3 Facility
	was reached between 195 countries. This Agreement is open for signature and subject to ratification, acceptance or approval by States and regional economic integration organisations that are Parties to the Convention from 22 April 2016 to 21 April 2017. Thereafter, this Agreement shall be open for accession from the day following the date on which it is closed for signature. The agreement can only be sanctioned once it has been ratified by 55 countries, representing at least 55% of emissions. South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for Kiara PV3 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.
Climate Change Bill, 2018	On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. Kiara PV3 Facility comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
National Biodiversity Economy Strategy (NBES) (March 2016)	The biodiversity economy of South Africa encompasses the businesses and economic activities that either directly depend on biodiversity for their core business or that contribute to conservation of biodiversity through their activities. The commercial wildlife and the bioprospecting industries of South Africa provide cornerstones for the biodiversity economy and are the focus of this strategy. Both the wildlife and bioprospecting sub-sectors of the biodiversity economy have already demonstrated the potential for significant future development and growth. In the study commissioned on the situational analysis of the biodiversity economy, the contribution of the biodiversity economy to the national economy can be measured in terms of Gross Domestic Product (GDP), with the wildlife and bioprospecting industries contributing approximately R3 billion to GDP in 2013. Growth in the wildlife and bioprospecting industries can make a significant impact on the national economy, while contributing to national imperatives such as job creation, rural development and conservation of our natural resources.

Relevant legislation or policy	Relevance to Kiara PV3 Facility
	The Wildlife Industry value chain is centred on game and wildlife farming/ranching activities that relate to the stocking, trading, breeding, and hunting of game, and all the services and goods required to support this value chain. The key drivers of this value chain include domestic hunters, international hunters and a growing retail market demand for wildlife products such as game meat and taxidermy products. This sector is therefore characterised by an interesting combination of agriculture, eco-tourism and conservation characteristics. Over the period 2008-2013, the total Wildlife Industry market grew by more than 14% per year. This growth comprised an average annual growth exceeding 6% in domestic hunting, a decrease in international hunting, and an exponential growth in live auction sales. It is considered likely that the consolidated Wildlife Industry has the potential to experience a weighted average annual growth rate of between 4 %-14 % per year up to 2030. In order for the wildlife and bioprospecting sub-sectors of the biodiversity economy to achieve its full potential, a strategic partnership between the state, private sector and communities is required. To this end, a National Biodiversity Economy Strategy (NBES) is required to guide the sustainable growth of the wildlife and bioprospecting industries and to provide a basis for addressing constraints to growth, ensuring sustainability, identifying clear stakeholder's responsibilities and monitoring progress of the Enabling Actions. The Vision of NBES is to optimise the total economic benefits of the wildlife and bioprospecting industries through its sustainable use, in line with the Vision of the Department of Environmental Affairs. The purpose of NBES is to provide a 14-year national coordination, leadership and guidance to the development and growth of the biodiversity economy. NBES has set an industry growth goal stating that by 2030, the South African biodiversity economy will achieve an average annualised GDP growth rate of 10% per annum. This envisioned growth curve extends into the year 2030 and is aligned to the efforts of the country's National Development Plan, Vision 2030. The NBES seeks to contribute to the transformation of the biodiversity economy in South Africa through inclusive economic opportunities, reflected by a sector which is equitable - equitable access to resources, equitable and fair processes and procedures and equitable in distribution of resources (i.e. business, human, financial, indigenous species, land, water) in the market. To address these transformation NBES imperatives, NBES has the principles of: » Conservation of biodiversity and ecological infrastructure » Sustainable use of indigenous resources » Fair and equitable beneficiation » Socio-economic sustainability » Incentive driven compliance to regulation » Ethical practices » Improving quality and standards of products. The NBES provides the opportunity to redistribute South Africa's indigenous biological/ genetic resources in an equitable manner, across various income categories and

Relevant legislation or policy	Relevance to Kiara PV3 Facility
	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 Ngaka Modiri Molema District Municipality within which the Kiara PV3 Facility is proposed is identified as a Rural Biodiversity Economy Transformation Node. 

4.5 Provincial Planning and Context

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 Kiara PV3 Facility

Relevant policy	Relevance to Kiara PV3 Facility
North West Provincial Development Plan (PDP), 2013 (updated 2017/2022)	The North West Provincial Development Plan (PDP) 2013 (updated 2017/2022) states that the overarching objective, is to overcome certain obstacles relating to the current infrastructure by introducing renewable energy together with energy conservation and efficiency strategies. Furthermore, this will craft a better tomorrow and ensure that underdevelopment, poverty, and inequality is fully addressed in the North West Province. The overall energy objective for the province also includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the province through

Relevant policy	Relevance to Kiara PV3 Facility
	appropriate financial and fiscal instruments. With the developed and proposed independent power producer capacity (including the Kiara PV3 facility), the province will produce its own electrical power needs from renewable energy resources (although this energy will be fed into the national grid).
North West Province Spatial Development Framework (SDF) (2016) – Published 2017	The Spatial Development Framework (SDF) addresses the need for spatial planning, socio-economic development, infrastructure and conservation of natural resources. Key socio-economic issues which would require strategic planning provision include: employment (including youth and women); poverty eradication; attracting investment; economic growth; HIV / AIDS and other diseases; food security; physical infrastructure (including availability of industrial land); illiteracy; tourism development; population growth, urbanization and migration. Natural resource issues include inadequate water resources for future development; bush encroachment and alien invasive species; land and soil degradation; and overgrazing. With regard to spatial planning, the legacies of Apartheid-era policy is identified as a key issue and residents of the North West are consequently extremely underdeveloped. As per the North West Provincial Spatial Development Framework (PSDF) (2017) electricity within the province is primarily provided by Eskom to re-distributors – mainly municipalities (10%), commercial (5%), agriculture (5%), mining (30%), industrial (30%) and Residential (20%). According to the North West PSDF the proposed project site is located within the Mahikeng Distribution Area, which is characterised by minor developments, including Commercial, Industrial, and Major Electrification; and has a projected growth of 125MW (Eskom, 2015). Eskom's Transmission Development Plan 2015 – 2024 represents the transmission network infrastructure investment requirements over the 10 year period between 2015 and 2024. Projects proposed for the North West Province for the next 10 years include the introduction of 400kV power lines and transformation to support or relieve the existing networks. Five transmission power corridors have been identified as critical to providing a flexible and robust network that could respond to meet the needs of future IPPs and IRP requirements. The development of the proposed PV facility and its associated grid connection infrastructure will contribute to economic growth and development, which will in turn help eradicate poverty through job creation and skills development in the region which will be in line with the North West SDF.
Renewable Energy Strategy for the North West Province (2012)	In 2012 the North West Province's then Department of Economic Development, Environment, Conservation and Tourism (DEDECT) developed the Renewable Energy Strategy for the North West Province. The strategy was developed in response to the need of the North West Province to participate meaningfully within South Africa's RE sector. The RE strategy aims to improve the North West Province's environment, reduce its contribution to climate change, and alleviate energy poverty, while promoting economic development and job creation whilst developing its green economy. According to the strategy the North West Province consumes approximately 12% of South Africa's available electricity, and is rated as the country's fourth largest electricity consuming province. This is mainly due to the high demand of the electrical energy-intensive mining and related industrial sector, with approximately 63% of the electricity supplied to the province being consumed in its mining sector.

Relevant policy	Relevance to Kiara PV3 Facility
	While the strategy recognises that South Africa has an abundance of RE resources available, it is cognisant of the fact that the applicability of these RE resources depend on a number of factors and as a result are not equally viable for the North West Province. The RE sources that were identified to hold the most potential and a competitive strength for the North West Province are Solar Energy (photovoltaic as well as solar water heaters), Municipal Solid Waste, hydrogen and fuel cell technologies, bio-mass, and energy efficiency. The advantages and benefits for the North West Province associated with the implementation and use of RE technologies include: » Provision of energy for rural communities, schools and clinics that are far from the national electricity grid. » Creation of an environment where access to electricity provides rural communities with the opportunity to create an economic base via agricultural and home-based industries and Small, Medium and Micro Enterprises (SMMEs) in order to grow their income-generating potential. » The supply of water within rural communities. » It would result in less time taken for the collection of wood and water, thus improving the quality of life within communities and specifically for women. » Improved health through the reduced use of fuelwood as energy source for cooking and heating that causes respiratory and other hazards. » Solar water heating for households in urban and rural settings, reducing the need for either electricity (in urban settings) and fuelwood (in rural settings) to heat water, thus lowering our National peak demand and conservation of woodlands in a sustainable manner. » Large-scale utilisation of renewable energy will also reduce the emissions of carbon dioxide, thus contributing to an improved environment. » The fact that RE go hand-in-hand with energy efficiency, it will result in additional financial benefit and the need for smaller RE systems. » The development of a strong localised RE industry within the NWP holds substantial potential for Black Economic Empowerment (BEE) and job creation within the Province. » The establishment of a strong RE base in the North West Province, especially in the manufacturing of fuel cells could stimulate the market for Platinum Group Metals (PGM), which would in turn help the local mining sector. This is due to RE sources having considerable potential for increasing security of supply by diversifying the energy supply portfolio and increasingly contributes towards a long-term sustainable energy future. In terms of environmental impacts, RE results in the emission of less GHGs than fossil fuels, as well as fewer airborne particulates, and other pollutants. Furthermore, RE generation technologies save on water consumption in comparison with coal-fired power plants.
North West Provincial Growth and Development Strategy (PGDS) 2004-2014	Goals and objectives of the North West Provincial Growth Development Strategy are to fight poverty and unemployment, improve the low level of expertise and skills which are classified as both immediate and long-term goals and require primary goals for sustained growth and economic development. The proposed facility will contribute to employment creation and skills development which is in line with the goals and objectives of the North West PGDS.

Relevant policy	Relevance to Kiara PV3 Facility
	The North West Provincial Growth Development Strategy aims at building a sustainable economy to eradicate poverty and improve social development. The proposed Grid infrastructure will contribute to growth and development of the local area by expanding the economic base and creating employment opportunities.

4.6 Local Policy and Planning Context

The local tiers of government relevant to the Kiara PV3 Facility project are the Ditsobotla Local Municipality and the Ngaka Modiri Molema District Municipality. Instruments and/or policies at both the district and local level contain objectives which align with the development of Kiara PV3 Facility. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 4.4: Relevant district and local legislation and policies for Kiara PV3 Facility

Relevant policy	Relevance to Kiara PV3 Facility
Ngaka Modiri Molema District Municipality Integrated Development Plan (IDP), 2017-2022	The vision of the Ngaka Modiri Molema District Municipality as contained within its IDP 2017 – 2022 can be summarised as follows: "*Leaders in integrated municipal governance*". The vision of the Ngaka Modiri Molema District Municipality is: "*To provide a developmental municipal governance system for a better life for all*". In recognition of its vision and mission, the Ngaka Modiri Molema District Municipality has adopted the following strategic development goals for the District: » Institutional Transformation and Organisational Development. » Provision of Infrastructure for Basic Service Delivery. » Economic Development. » Financial Viability. » Good Governance. With regards to "Economic Development", the following additional strategic objectives have been identified: » To facilitate economic development by creating a conducive environment for business development. » Unlock opportunities to increase participation amongst all sectors of society in the mainstream economy to ultimately create decent job opportunities. » To promote Local Economic Development » To enhance rural development and agriculture » To Expand Public Works Programme The implementation of Kiara PV3 facility would therefore contribute positively towards local economic development, as well as the creation of new job opportunities within the Ngaka Modiri Molema District Municipality.
Ditsobotla Local Municipality	The vision statement for the Ditsobotla LM as contained within the IDP 2017 – 2018 is as follows:

<table>
<tr><th>Relevant policy</th><th>Relevance to Kiara PV3 Facility</th></tr>
<tr><td>Integrated Development Plan (IDP), 2017 – 2018 and draft reviewed 2020-2021</td><td>"A developmental municipality dedicated to the social and economic upliftment of its communities."

The Mission Statement of the Ditsobotla LM is as follows:

"Sustainable service delivery through: transparent administration, dedicated staff, implementation of municipal programmes, and consultation with communities."

The following key issues and objectives have been identified for the Ditsobotla LM:

<table>
<tr><th>Key issues</th><th>Key objectives</th></tr>
<tr><td>The municipality's financial position is poor due to inadequate capacity as well as poor finance management controls / systems.</td><td>A fully capacitated municipal administration capable of developing and implementing effective financial controls.</td></tr>
<tr><td>The organisational design does not respond to service delivery challenges. There is no adequate capacity in technical functions of the municipality.</td><td>Capacitated institution structured in a way that enables efficient and effective service delivery.</td></tr>
<tr><td>High levels of poverty and unemployment, skills shortage, and inequalities within the Ditsobotla LM.</td><td>Create an environment conducive for economic growth, sustainable employment opportunities and growth in personal income levels of communities.</td></tr>
<tr><td>Backlogs in the provision of social services, infrastructure, service delivery and economic opportunities.</td><td>A well-structured Ditsobotla LM able to support sustainable human settlement and enable residents meets their social and economic needs.</td></tr>
</table>

The implementation of Kiara PV3 facility would contribute towards addressing the Ditsobotla Local Municipality key issue regarding high levels of poverty and unemployment, skills shortage, and inequalities, through the creation of employment opportunities, the provision of skills training opportunities, and local economic growth, including growth in personal income levels of those community members who would be employed on the project. In addition, the REIPPP Programme requires preferred bidders to make minimum contributions towards local economic development and social upliftment, to be focused on benefitting local communities within the vicinity of the project site.</td></tr>
</table>

4.7. Conclusion

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and national level.

CHAPTER 5: NEED AND DESIRABILITY

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

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

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

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

Requirement	Relevant Section
3(1)(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	The need and desirability for the development of Kiara PV3 Facility is included and discussed as a whole within this chapter. The need and desirability for the development of the solar PV facility has been considered from an international, national, regional and site-specific perspective.

5.2 Need and Desirability from an Energy Perspective

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

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

5.3 Need and Desirability from an International Perspective

The need and desirability of Kiara PV3 Facility, from an international perspective, can be described through the project's alignment with internationally recognised and adopted agreements, protocols and conventions. South Africa is a signatory to a number of international treaties and initiatives, including the United Nation's Development Programme's (UNDP's) Sustainable Development Goals (SDGs). The SDGs address global socio-economic challenges such as poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanisation, environment and social justice. The SDGs consist of 17 global goals set by the United Nations. The 17 SDGs are characterised by 169 targets, and 304 indicators.

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

Targets		Indicators	
7.1	By 2030, ensure universal access to affordable, reliable, and modern energy services.	7.1.1 7.1.2	Proportion of population with access to electricity. Proportion of population with primary reliance on clean fuels and technology.
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix.	7.2.1	Renewable energy share in the total final energy consumption.
7.3	By 2030, double the global rate of improvement in energy efficiency.	7.3.1	Energy intensity measured in terms of primary energy and GDP.
7.A	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.	7.A.1	Mobilised amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment.
7.B	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.	7.B.1	Investments in energy efficiency as a percentage of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services.

The development of Kiara PV3 Facility would contribute positively towards Goal 7 of the SDGs through the following:

- By generating up to 120MW (contracted capacity) of affordable and clean energy. Solar power technology is one of the cleanest electricity generation technologies, as it does not result in the release of emissions during its operation.
- By contributing towards South Africa's total generation capacity, specifically through the utilisation of renewable energy resources.

The Kyoto Protocol (1997) is also relevant to the need for the development of the Kiara PV3 Facility from an international perspective. The protocol calls for the reduction of South Africa's greenhouse gas emissions

through actively cutting down on using fossil fuels, or by utilising more renewable resources. The development of the Kiara PV3 Facility will add capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements, as set out in the protocol, through the generation of energy without the emission of greenhouse gasses.

5.4 Need and Desirability from a National Perspective

Following the energy crisis in 2008, South African Government started to introduce renewable energy developments on a large scale and further enhanced the promotion of energy efficiency in all sectors to meet the demand of energy while reducing CO_2 emissions and creating jobs10. Consequently, significant investment in renewable energy and energy efficient technologies is required. Increasing the diversity of South Africa's electricity mix is important, not only for enhancing the crucially important security of supply of the country, but also to support job creation and mitigate climate change.

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

South Africa needs to build about 40 000MW of new generation capacity by 2025 to meet demand requirements. According to the IRP, 17742MW should be provided by renewable energy projects. To achieve this, the government plans to install a total of 17GW of wind energy, 8288MWof solar photovoltaic energy, and 600 MW of concentrated solar power by 2030.

Kiara PV3 Facility is proposed in specific response to the requirement for diversification of the country's energy mix to include renewable energy such as solar PV as detailed in the IRP 2019. As a result, the need and desirability of Kiara PV3 Facility from a national perspective can largely be linked from the project's alignment with national government policies, plans, and programmes which have relevance to energy planning and production (as discussed in detail in **Chapter 5**). The following key plans have been developed by National Government to consider South Africa's current energy production, projected future demands, and provides the necessary framework within which energy generation projects can be developed:

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

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

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

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

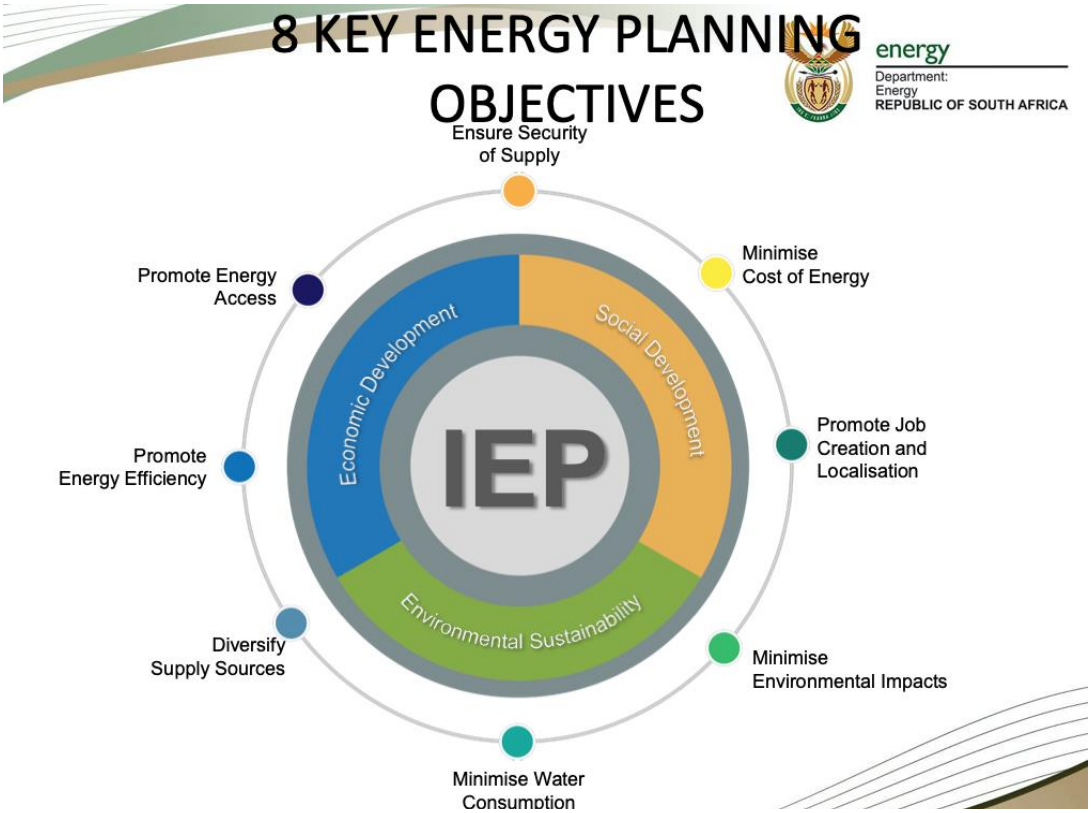


Figure 5.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

The latest iteration of the IEP (25 November 2016) contained the following statement regarding solar power in South Africa:

"*South Africa experiences some of the highest levels of solar radiation in the world and this renewable resource holds great potential for the country. The daily solar radiation in South Africa varies between 4.5 and 6.5 kilowatt hours per square meter (kWh/m²) (16 and 23 megajoules per square meter [MJ/m²]) (Stassen, 1996), compared to about 3.6kWh/m² in parts of the United States and about 2.5kWh/m² in Europe and the United Kingdom. The total area of high radiation in South Africa amounts to approximately 194 000km², including the Northern Cape, which is one of the best solar resource areas in the world. With electricity production per square kilometre of mirror surface in a solar thermal power station being 30.2MW, and just 1% of the high radiation area in the country being made available for solar power generation, the generation potential is approximately 64GW. Solar energy has the potential to contribute quite substantially to South Africa's future energy needs. This would, however, require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres*."

In terms of electricity generation, the IEP states that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources, and includes the following statement regarding solar energy's contribution to the diversified energy mix:

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

The IRP for Electricity 2010 – 2030 (gazetted in 2019) is a subset of the IEP and constitutes South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. This plan provides for the development of 8288MW of capacity from Solar Photovoltaic energy facilities by 2030, with an annual contribution of 1000MW from 2022.

Provision has been made for new additional capacities in the IRP 2019 (refer to **Table 5.1**).

Table 5.1: Overview of the total installed capacity expected by 2030

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

Renewable resources are valuable in contributing towards electricity generation and diversifying South Africa's electricity mix, while contributing towards South Africa's response to Climate Change. A number of IPP Procurement Programmes have been initiated to secure electricity generated from a range of resources from the private sector (i.e., from Independent Power Producers, or IPPs). Under these Programmes, IPPs are invited to submit proposals for the finance, construction, operation, and maintenance of electricity generation facilities for the purpose of entering into an Implementation Agreement with the DMRE and a Power Purchase Agreement (PPA) with Eskom as the buyer.

Between 2011 and 2021, the South African Government, through its IRP 2010 - 2020, have successfully launched and completed five bidding windows under the REIPPPP[11] (refer to Table **Figure 5.2**[12]).

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

*Estimation; TBD – To be Determined

Source: Finergreen

Figure 5.2: Overview of bid windows 1 to 5

Figure 5.2 shows that between 2011 and 2015 (excluding bid window 5), 302 bids were submitted, with around 30% (92) of the projects receiving approval. From those 92 projects, close to 70% (4.41GW) are already in operation, with wind and solar PV projects compromising most of the projects awarded (roughly 86%). In addition, of the 11.5GW of total capacity offered, 6.3GW (roughly 71%) was allocated, with wind and solar PV projects comprising the majority of projects.

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

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

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

» The utilisation, application and investment in renewable energy resources in South Africa is considered to be an essential means of reducing the carbon footprint of the country,

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

[12] 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021. 860MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 5 in December 2022.

» Diversifying the national economy,
» Reducing poverty, and
» Providing critical additional energy to that of Eskom.

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

1. Priority interventions for economic recovery: the plan sets out eight priority interventions that will ignite South Africa's recovery and reconstruction effort. These are the flagship initiatives that all of society will rally around to build a new economy (**Figure 5.3**).
2. Enabling conditions for growth: these are growth-enhancing reforms and other preconditions for an inclusive, competitive and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery requires careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution and is supported by enhanced institutional arrangements to ensure implementation and accountability.

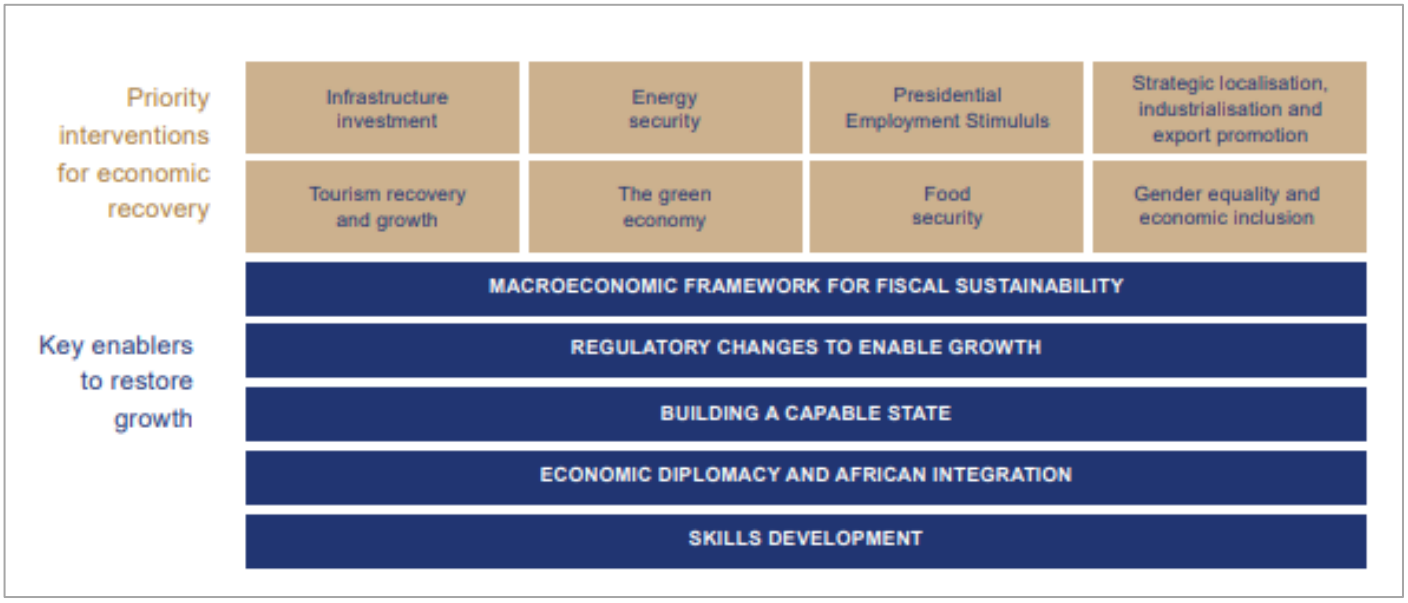


Figure 5.3: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

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

The South African government has identified the green economy as one of 12 job drivers that could help contribute to creating 5 million additional jobs by 2020. The New Growth Path, in which the sectoral jobs targets are disaggregated, envisages that as many as 300 000 new direct jobs could be created in the areas of natural resource management and renewable energy construction (Department of Energy, 2019). Even though the project will not form part of the REIPPP programme, the Applicant will implement similar social and economic development strategies, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-economic development. In addition to electricity generation and supply the project will therefore also contribute positively towards socio-economic development of a region, over and above job creation.

The need for new power generation from solar energy has therefore been identified and assessed by Government at a national scale considering the national energy requirements as well as international commitments to address climate change under the Paris Agreement and reaffirmed at COP26, and provision has been made for the inclusion of new solar power generation capacity in South Africa's energy mix. The implementation of the Kiara PV3 Facility, therefore, has the potential to contribute positively towards the identified national need, while simultaneously contributing to job creation and socio-economic development, which is identified as a need for the country within the National Development Plan. The PV facility will make use of solar energy technology and will contribute positively towards reducing South Africa's GHG emissions and the Just Energy Transition of the country. In addition, by making use of solar power technology, the project will have reduced water requirements, when compared with some other generation technologies such as coal and gas, in alignment with one of the vision 2030 themes of DWS's National Water Resource Strategy 2 (2013) (i.e. transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

5.4.1. Benefits of Renewable Energy and the Need and Desirability in the South Africa Environment

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

Socio-economic upliftment of local communities: Kiara PV3 Facility has the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. Some of the challenges facing the Local and District municipalities, as detailed in the IDPs include high rates of unemployment, high levels of poverty, and low levels of development despite the strategic local in terms of the national transport corridors. The Local and District municipalities are therefore in need of economic development, sustainable employment opportunities and growth in personal income levels.

Since inception of the REIPPPP in 2011 up to bid window 4, approximately 109 400 job years for South African citizens to date have been created[13].

Kiara PV3 Facility also has the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPPP, the project will commit benefits to the local community in the form of job creation, localisation, and community ownership. In accordance

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

with the DMRE's bidding requirements of the REIPPP, a percentage of the revenue generated per annum during operation will be made available to local communities through a social beneficiation scheme. Therefore, the potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment.

Increased energy security: Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. According to CSIR's power sector statistics[14], South Africa experienced loadshedding for 1 169 hours in 2021 (13% of the time) wherein 2 521GWh of estimated energy was shed (mostly stage 2 load shedding). This is a 40% increase on the total loadshedding experienced during 2020. It is important to note that although extensive load shedding continued during 2021, record relative variable renewable energy contributions were recorded, with solar PV contributing 5.1 TWh.

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

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

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

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

» 6 422MW of electricity had been procured from 112 Renewable Energy Independent Power Producers (IPPs) in seven bid rounds[15].
» 5 078 MW of electricity generation capacity from 79 IPP projects has been connected to the national grid.
» 59 761GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational in November 2013. Renewable energy IPPs have proved to be very reliable. Of the 79 projects that have started operations, 67 projects have been operational for longer than a year. The electrical energy generated over the past 12-month period for the 67 projects is

[14] CSIR Energy Centre. Statistics of utility-scale power generation in South Africa in 2021. April 2022
[15] Bid windows1, 2 ,3 ,3.5 ,4 and small BW1(1S2) and small BW2(2S2). 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021. 860MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 5 in December 2022.

11 679GWh, which is 94% of their annual energy contribution projections of 12 481GWh over a 12-month delivery period. Twenty-six (26) of the 67 projects (39%) have individually exceeded their projections.

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

Economics: As a result of the excellent resource and competitive procurement processes, both wind power and solar PV power are now proven in South Africa as cheaper forms of energy generation than coal power. They offer excellent value for money to the economy and citizens of South Africa while benefitting society as a whole through the development of clean energy.

The following has been achieved by the IPP programme (March 2021) in terms of investment and economics:

- Investment (equity and debt) to the value of R209.7 billion was attracted in seven bid rounds.
- Socio-economic development contributions of R1.5 billion to date, of which R103.5 million was spent in this 2021 reporting quarter.
- Enterprise development contributions of R463.5 million to date, of which R34.8 million was spent in this 2021 reporting quarter.

Pollution reduction: The release of by-products through the burning of fossil fuels for electricity generation has a particularly hazardous impact on human health and contributes to ecosystem degradation. The use of solar irradiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.

The overview of the Independent Power Producers Procurement Report (March 2021) indicates that a carbon emission reduction of 60.7 Mton CO_2 has been realised by the IPP programme from inception to date, of which 3.6 Mton is in the 2021 reporting quarter.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of GHG emissions. According to the Climate Transparency Report (2020), total GHG emissions in South Africa (excluding land use) have increased by 41% since 1990, but emissions in recent years have been almost constant, owing largely to low economic growth and a sharp rise in electricity prices. South Africa is ranked 12th worldwide in terms of per capita carbon dioxide emissions as of 2021[18]. Since its inception, the REIPPPP has achieved carbon emission reductions[19] of 60.7 Mton of CO_2. The development of Kiara PV3 Facility, and the associated electricity generated as a result of the facility, will result in considerable savings on tons of CO_2 emissions.

Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol and the Paris Agreement, and for cementing its status as a leading player within the international community.

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa.

The construction phase will create temporary employment opportunities and the operation phase will create limited full-time employment opportunities.

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

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

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

5.5 Need and Desirability of the project from a Regional Perspective

South Africa's electricity generation mix has historically been dominated by coal. However, up to 2030, a new capacity demand will be driven by the decommissioning of existing coal-fired power stations. A further 24 100MW (**Figure 5.4**) of coal power is expected to be decommissioned in the period 2030 to 2050. Therefore, additional capacity will be required from renewable energy sources, with the solar PVs being allocated 1000MW for the period up to 2030.

	Coal	Cost (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	GAS/ Diesel	Other (Distributed Generation, Cogeri, Biomass, Landfill
Current	31715		1860	2100	2912	1474	1980	300	3830	499
2019	2155	-2372	-	-	-	-	244	300	-	Allocation to the intent of the short term capacity and energy gap
2020	1433	-557	-	-	-	114	300	-	-	
2021	1433	-1403	-	-	-	300	818	-	-	
2022	755	-344	-	-	513	400 1000	1600	-	-	
2023	750	-555	-	-	-	1000	1600	-	-	500
2024	1 000	-	1660	-	-	-	1600	-	1000	500
2025	7 000	-	-	-	-	1000	1600	-	-	500
2026	-	-1734	-	-	-	-	1600	-	-	500
2027	750	-547	-	-	-	-	1600	-	2000	500
2028	-	-475	-	-	-	1000	1600	-	-	500
2029	-	-1654	-	-	1575	1000	1600	-	-	500
2030	-	-1656	-	1500	-	1000	1600	-	-	500
Total Installed Capacity by 2030 (MW)	33164		1660	4600	5000	8288	17742	600	6380	-
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	-
% Annual Energy Contribution (% of MWh)	58.3		4.5	0.3	1.2	6.3	17.8	0.6	1.3	-

Figure 5.4: A snapshot of the Energy Mix as per the IRP 2019

Although the majority of South Africa's electricity generation infrastructure (coal-fired power stations) is currently located within Mpumalanga due to the location of coal resources within this province, the North West Province has been identified as an area where electricity generation from solar energy facilities is highly feasible and a viable option. The location of the study area and project site within the North West Province is therefore considered to support the Province/Region's generation targets.

The overarching objective for the Kiara PV3 Facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. From a regional site selection perspective, this region is considered to be preferred for solar energy development by virtue of its abundant solar resource.

The North West Provincial Spatial Development Framework 2017 states that the overarching goal for the province is to enable sustainable development, and that the province considers social and economic development as imperative in order to address the most significant challenge facing the North West, which is poverty. The Provincial Spatial Development Framework identified five transmission power corridors have been identified as critical to providing a flexible and robust network that could respond to meet the needs of future IPPs and IRP requirements.

The development of the Kiara PV3 would contribute positively towards increased electricity provision in the North West Province, which could be used in the development of socio-economic infrastructure within the province, as well as to increase employment opportunities.
The North West Provincial Growth and Development Strategy identifies poverty reduction as the most significant challenge facing the government and its partners. All other societal challenges that the province faces emanate predominantly from the effects of poverty. The development of the Kiara PV3 has the potential to create employment opportunities, promote skills development, create opportunities to promote private sector investment and the development of SMMEs in the North West Province.

According to the Ngaka Modiri Molema District Municipality Integrated Development Plan (2017 – 2022), the vision of the District Municipality is "To provide a developmental municipal governance system for a better life for all". The Strategic Objectives to address the vision that are relevant to the project include the promotion of economic growth in the district and enhancement of service delivery. The development of the Kiara PV3 will promote economic development in the Ngaka Modiri Molema area, thereby assisting in addressing some the challenges faced by the district municipality as detailed in the IDP.

The Ditsobotla Local Municipality IDP (2020 – 2021) identified the following as some of the challenges facing the area in terms of economic development and growth.

- The municipality's financial position is poor due to inadequate capacity as well as poor finance management controls / systems.
- The organisational design does not respond to service delivery challenges. There is no adequate capacity in technical functions of the municipality.
- High levels of poverty and unemployment, skills shortage, and inequalities within the Ditsobotla LM.
- Backlogs in the provision of social services, infrastructure, service delivery and economic opportunities

These issues can be addressed by supplier and enterprise development and enterprise development spend linked to the Kiara PV3 Facility.

5.6 Need and Desirability of the project from a District and Local Perspective

The Strategic Objectives to address Ngaka Modiri Molema District Municipality and Ditsobotla Local Municipality vision that are relevant to the project include the promotion of economic growth in the district and enhancement of service delivery. The potential in the area for Renewable Energy developments including the development of the Kiara PV3 Facility will promote economic development in the Ngaka Modiri Molema District and the Ditsobotla Local Municipality area, thereby assisting in addressing some of the challenges faced locally such as.

- High levels of poverty and low levels of education.
- Low levels of development despite the strategic location in terms of the national transport corridors.
- High rate of unemployment, poverty, and social grant dependence.
- Prone to significant environmental changes owing to long-term structural changes (such as climate change, energy crises and other shifts).

These issues can be addressed by supplier and enterprise development and enterprise development spend linked to the Kiara PV3 Facility.

5.7 Receptiveness of the proposed development area for the establishment of Kiara PV3 Facility

The placement of a solar PV facility is strongly dependent on several factors including climatic conditions (solar irradiation levels), topography, the location of the site, and in particular the location in a node for renewable projects, availability of grid connection, the extent of the site and the need and desirability for the project as detailed in chapter 3. From a local level perspective, the project site and development area have specifically been identified by the proponent as being highly desirable from a technical perspective for the development of a solar PV facility.

5.8 Conclusion

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

CHAPTER 6: APPROACH TO UNDERTAKING THE EIA 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 Kiara PV3 Facility is a listed activity requiring Environmental Authorisation (EA). The application for EA is required to be supported by an Environmental Impact Assessment (EIA) process based on the contracted capacity of the facility being 120MW 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**.

A comprehensive consultation process has been designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which includes I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders, while remaining within the limits as stipulated by the National Government. This chapter outlines the process that was followed during the Scoping Phase of the EIA process.

The EIA process is illustrated in Error! Reference source not found..

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

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

This chapter includes the following information required in terms of Appendix 3: Content of an EIAreport:

Requirement	Relevant Section
3(c) 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 6.2**.
3(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 Kiara PV3 Facility is included in **Section 6.5.2** and copies of the supporting documents and inputs are included in **Appendix C**.
3(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 C**.
3(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 6.5.3**.

6.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to Kiara PV3 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. Relevant permitting requirements are detailed within **Table 6.5**.

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

NEMA (No. 107 of 1998) is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the Competent Authority (the decision-maker) charged by NEMA with granting of the relevant Environmental Authorisation (EA). Due to the fact that Kiara PV3 Facility is a power generation project and therefore relates to the IRP for Electricity 2010 – 2030, the National Department of Forestry, Fisheries and the Environment (DFFE) has been determined as the Competent Authority (CA) in terms of GNR 779 of 01 July 2016. The Provincial authority, the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) is a Commenting Authority on the project.

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

The EIA process being conducted for the Kiara PV3 Facility is undertaken in accordance with Section 24(5) of the NEMA, which defines the procedure to be followed in applying for EA, and requires that

the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA). **Table 6.1** contains all the listed activities identified in terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324) which may be triggered by the proposed development of the Kiara PV3 Facility and associated infrastructure, and for which an application for EA has been made:

Table 6.1: Listed activities identified in terms of the Listing Notices (GNR 327, 325 and 324)

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV or more. ***Facility substation and a 132kV power line from the on-site substation are proposed to connect the PV facility to the switching collector substation.***
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 metres of a watercourse. ***The construction and operation of the PV facility and associated infrastructure will occur within watercourses, or within 32m of watercourses. The infrastructure will have a physical footprint of more than 100 square metres.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	14	The development and related operation of facilities and infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. ***The development of Kiara PV3 Facility will require the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the on-site substation where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	24 (ii)	The development of a road – (ii) with a reserve wider than 13.5m, or where no reserve exists where the road is wider than 8m. ***Access roads will be developed during the construction phase of the project. These are likely to exceed 8m in width.***

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1ha. ***The total area to be developed for the PV facility and associated infrastructure is greater than 1ha and occurs outside an urban area in an area currently zoned for agriculture.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	56 (ii)	The widening of a road by more than 6 m, or lengthening of a road by more than 1 km – (ii) where no reserve exists, where the existing road is wider than 8 metres ***Existing roads may require widening of up to 6m and/or lengthening by more than 1km, to accommodate the movement of heavy vehicles and cable trenching activities.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended)	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more. ***The proposed PV facility will have a capacity that exceeds 20MW. The Kiara PV3 Facility will have a contracted capacity of 120MW.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended)	15	The clearance of an area of 20ha or more of indigenous vegetation[16]. ***Kiara PV3 Facility will require the clearance of an area in excess of 20ha for the development of the PV facility and associated infrastructure.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	18h(v)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. h. North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ***The development of the PV facility and associated infrastructures will require the development of roads wider than 4m within ESA areas.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	10h(iv)	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 h. North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

[16] "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
		The development of the PV facility and associated infrastructures will require the storage and handling of a dangerous good with a capacity of 80 cubic meters within ESA areas.
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	12h(iv)	The clearance of an area of 300 square metres or more of indigenous vegetation. h. North West iv. Within critical biodiversity areas identified in systematic biodiversity plan adopted by the competent authority. ***The development of the PV facility and associated infrastructures will require the clearance of more than 300 square meters of indigenous vegetation within areas classified as ESAs.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	14(ii)(a)(c)(h)(iv)	The development of — (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; or (c) within 32 metres of a watercourse, measured from the edge of a watercourse. h. North West (iv) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority. ***The development of the PV facility will require the establishment of infrastructure with a physical footprint exceeding 10m2 within 32m of the watercourses and within areas classified as ESAs.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	18h(v)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. h. North West v) Within critical biodiversity areas identified in systematic biodiversity plan adopted by the competent authority. ***The development of the PV facility and associated infrastructures may require the widening of a road by more than 4 metres, outside urban areas and within areas classified as ESAs.***

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

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e., the Regional Department of Water and Sanitation (DWS) or the relevant Catchment Management Agency (CMA)). Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities

(activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Two prominent wetland systems are indicated for the study area. A large lower lying wetland area transects the northern portion of the area.

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

Table 6.2: List of Water Uses published under Section 21 of NWA, as amended.

Notice No.	Activity No.	Description of Water Use
NWA (No. 36 of 1998)	Section 21 (c)	Impeding or diverting the flow of water in a watercourse ***Kiara PV3 has a large drainage area occurring in the central portion of the study area***
NWA (No. 36 of 1998)	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***Kiara PV3 has a large drainage area occurring in the central portion of the study area .***

In the event that the flow of water in the watercourses is affected and the bed, banks or course characteristics are altered, or where development is located within 500m of a wetland, 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 and the project selected as Preferred Bidder. This is in line with the requirements of the Department of Water and Sanitation (DWS).

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

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

Section 38: Heritage Resources Management

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

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

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

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

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

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

6.3 Overview of the Scoping and EIA (S&EIA) Process being undertaken for Kiara PV3 Facility

In terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325) and Listing Notice 3 (GNR 324) the development of Kiara PV3 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 6.2**):

» The **Scoping Phase** includes the identification and description of potential issues associated with the project through desktop studies, field surveys, as well as consultation with I&APs and key stakeholders through a Public Participation process. The entire development area 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) a Scoping Report was prepared for the project and subjected to a 30-day review and comment period during which any Interested and Affected Party (I&AP) or Authority were invited to review and provide comment on the findings. Following the completion of the review period, a Final Scoping Report which incorporated all comments received during the 30-day public review and comment period, was prepared and submitted to DFFE for its consideration. Following its receipt of the Final Scoping Report DFFE had 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 Scoping Report was approved by the Department on 16 September 2022.

» 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 DFFE for its consideration. Following its receipt of the Final EIA Report and EMPr, DFFE has 107 days within which to either grant or refuse the EA.

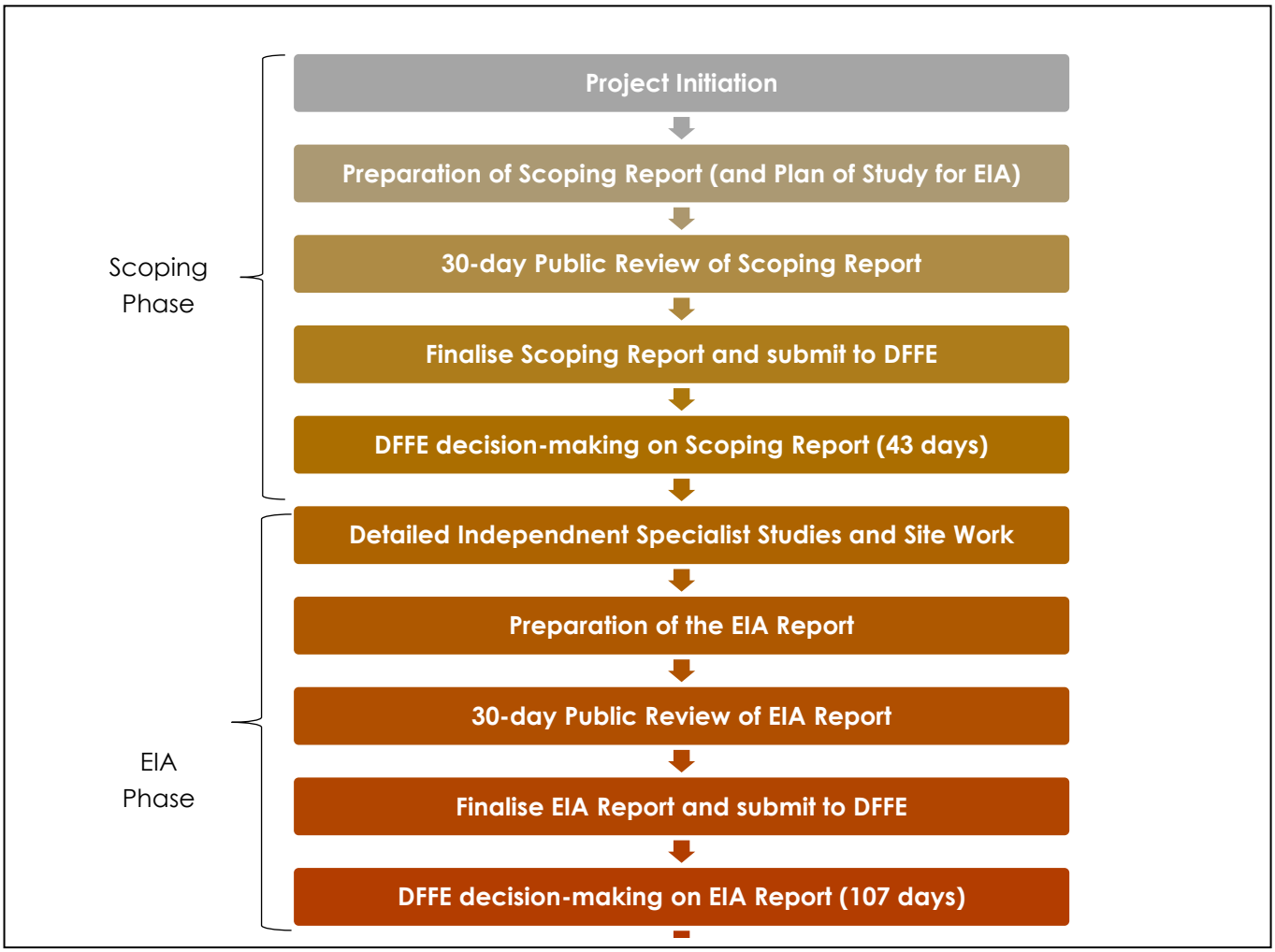


Figure 6.2: Regulated timeframe of an Environmental Impact Assessment (EIA) Process

6.4 Overview of the Scoping Phase

The final Scoping Report submitted to the DFFE on **05 August 2022** and subsequently accepted on **16 September 2022** documented the evaluation of potential environmental impacts associated with the Kiara PV3 Facility. The Scoping Phase was conducted in accordance with the requirements of the 2014 EIA Regulations (GNR 326), as amended, and therefore aimed to:

- Identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design, construction, operation and decommissioning) within the broader project site and development 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.

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

- Identify the policies and legislation relevant to the project.
- Motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred project location.
- Identify and confirm feasible alternatives for the project.
- Identify and describe potential impacts associated with the undertaking of the identified activities and proposed technology.
- Identify areas of high sensitivity to be avoided by the project infrastructure.
- Identify and list key issues associated with the project to be addressed during the EIA Phase through further detailed study and ground-truthing.
- Agree on the level of assessment, including the methodology to be applied, the expertise required, and the extent of further consultation to be undertaken in the EIA Phase of the process, with the aim of determining the extent of impacts associated with the activities through the life cycle of the project (i.e., construction, operation, and decommissioning).
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Key tasks undertaken within the Scoping Phase include:

- Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- Submission of the completed Application for EA to the competent authority (DFFE) 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 and concerns associated with the proposed project.
- Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR 326), as amended, and the requirements of the Specialist Protocols published in Regulation

GNR 320, issued on 20 March 2020 and GNR 1150 of 30 October 2020, where relevant, as well as other relevant guidelines.

» Preparation of a Scoping Report and Plan of Study for EIA in accordance with the requirements of Appendix 2 of the 2014 EIA Regulations (GNR 326).
» Provision of a 30-day public and authority review period for the Scoping Report.
» Preparation of a Comments and Response (C&R) Report detailing all comments raised by I&APs and responses provided as part of the Scoping Phase.
» Submission of a Final Scoping Report, including a Plan of Study for the EIA, to DFFE for review and acceptance on **05 August 2022**.

Table 6.5 provides a summary of the public participation process undertaken during the Scoping Phase.

Table 6.5: Summary of the public participation process undertaken during the Scoping Phase

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 Savannah Environmental's website.	**24 June 2022**
Placement of site notices.	**14 June 2022**
Advertising of the availability of the Scoping Report for a 30-day review and comment period in Noordwester Newspaper, including details on how to access the Scoping Report via Savannah Environmental's website	**24 June 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.	**24 June 2022**
30-day review and comment period of the Scoping Report.	**24 June 2022 to 25 July 2022**
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Interested & Affected Parties (I&APs)	Focus group meetings were held with key stakeholders on Wednesday, 20 July 2022 at 09h00, 11h00 and 15h00 via a virtual platform, where relevant.
Advertising of the availability of the EIA Report for a 30-day review and comment period in the 'Die Noordwester'.	**20 January 2023**
Distribution of notification letters announcing the availability of the EIA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	**20 January 2023**
30-day review and comment period of the EIA Report.	**20 January 2023 – 20 February 2023**
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners.	Date to be confirmed

Activity	Date
» Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions.	
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs.	Throughout EIA process

Acceptance of the Scoping Report and approval of the Plan of Study for the EIA Phase was received on **16 September 2022**, marking the start of the EIA Phase (refer to **Appendix B**). Additional Information requested by the DFFE in the acceptance of the Scoping Report and the location of the requested information in this EIA Report is detailed in **Table 6.4**.

Table 6.4: DFFE requirements and response/ reference to section in the EIA Report

DFFE requirements	Response/Reference to section in the EIA Report
Listed Activities (i) The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for. (ii) The listed activities represented in the EIAr, and the application form must be the same and correct. The EIAr must assess the correct sub listed activity for each listed activity applied for.	The impacts of each of the listed activities and the associated mitigation measures have been provided and include in **Chapter 8** of the EIAr. The listed activities that have been listed in the application are the same as the listed activities that have been included in Section 6.2 of the EIAr. The EIAr assess has assessed the correct sub listed activity for each listed activity being applied for in Section 6.2 of the EIAr.
Public Participation (i) Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. These include but are not limited to the North West Department of Economic Development, Environment, Conservation and Tourism, the Department of Agriculture and Rural Development, the Department of Water and Sanitation (DWS), the North West Department of Agriculture and Rural Development, the North West Department of Public Works and Roads, the North West Department of Community Safety and Transport Management, the North West Provincial Heritage Resources Authority (NWPHRA), South African Heritage Resources Agency (SAHRA), the South African National Roads Agency Limited (SANRAL), Eskom, the Ditsobotla Local Municipality, the Ngaka Modiri Molema District Municipality, the Endangered Wildlife Trust (EWT), BirdLife SA, the South African Civil Aviation Authority, and the Department of Environment, Forestry and Fisheries: Directorate Biodiversity and Conservation. Please ensure that all issues raised, and comments received on the draft SR and draft EIAr from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section: BCAdmin@environment.gov.za) in respect of the proposed activity are adequately addressed in the Final EIAr. Proof of correspondence with the various stakeholders unable to obtain comments, proof must be submitted to the Department of the attempts that were made to obtain	All comments received to date have been included within the Comments and Responses Report (Appendix C8). Where comments have not been obtained, proof that attempts were made to obtain comments have been included in Appendix C4 and Appendix C5. The database detailing registered I&APs is included as Appendix C1 to the EIA Report. Comments received during the 30-day review and comment period of the draft Scoping Report to date have been captured and addressed in the Comments and Responses Report attached as Appendix C8 to this EIA Report.

comments. The Public Participation Process must be conducted in terms of the approved public participation plan and Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended. (ii) A comments and response trail report (C&R) must be submitted with the final EIAr. The C&R report must incorporate all comments (pre and post submission of the draft EIAr) received for this development. The C&R report must be a separate document from the main report and the format must be in the table format which reflects the details of the I&APs and date of comments received, actual comments received, and response provided. Please ensure that comments made by I&APs are comprehensively captured (copy verbatim if required) and responded to clearly and fully. Please note that a response such as "Noted" is not regarded as an adequate response to I&APs comments.	
Layout & Sensitivity Maps (i) The EIAr must provide the four corner coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities. (ii) The EIAr must provide the following: - Clear indication of the envisioned area for the proposed 120MW Kiara PV3 Solar Power Facility; i.e., placing of PV arrays and all associated infrastructure should be mapped at an appropriate scale. - Clear description of all associated infrastructure (locations, lengths, widths and/or capacities). This description must include, but is not limited to the following: ➢ Access and internal road infrastructure; ➢ All supporting onsite infrastructure such as laydown area, guard house and control room etc. ➢ Infrastructures to be developed within watercourses; ➢ Powerlines; and ➢ All necessary details regarding all possible locations and sizes of the proposed on-site facility	All four corner coordinates points of the proposed development have been included in Section 1.2 of the EIAr. A clear facility layout is included in this EIA Report as Figure 10.1. The layout includes all the infrastructure associated with the facility as required.

substation. (iii) A copy of the final preferred layout map. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following: ➢ Permanent laydown area footprint; ➢ Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible) ➢ Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; ➢ The location of sensitive environmental features on site e.g., CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; ➢ Powerlines; ➢ Substation(s) and/or transformer(s) sites including their entire footprint; ➢ Location of access and service roads; ➢ PV arrays positions ➢ All existing infrastructure on the site, especially railway lines and roads; ➢ Buffer areas; ➢ Buildings, including accommodation; and ➢ All "no-go" areas. (iv) An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process. (v) A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	A map showing the layout overlain on the identified environmental sensitivities is included in this EIA Report as Figure 10.2.
Specialist assessments	

(i) The EAP must ensure that the terms of reference for all the identified specialist studies include the following: ➢ A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisations. Specialist assessments must be conducted in accordance with the Protocols. ➢ Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed. ➢ Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas. ➢ Should the specialist definition of 'no-go' area differ from the Departments definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable. ➢ All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA. ➢ Should a specialist recommend specific mitigation measures; these must be clearly indicated. (ii) Regarding cumulative impacts: ➢ Clearly defined cumulative impacts and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land. ➢ A detailed process flow to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. ➢ Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process.	A detailed description of the methodology, location and descriptions of the development footprint and all associated infrastructure has been included in the Specialist Assessments. The Specialist studies have been conducted in accordance with the Protocols. The Specialist Assessments have been included as **Appendix D – I** of the EIAr. All limitations associated with the specialist assessment have been included in the specialist studies included in the EIAr as **Appendix D – H**. The Department's definition of 'no-go' area is noted and has been considered within this EIA Report. The 'no-go' areas identified by the specialists have been considered by the developer when designing the facility layout. The specialist's definition of 'no-go' area is the same as that of the Department and various 'no-go' areas, including their associated buffer areas, have been recommended by the specialists and have been considered by the developer when designing the facility layout. All specialist studies attached to this EIA Report (refer to **Appendix D – I**) are final and provide detailed and practical mitigation measures and recommendations. The mitigation measures proposed by the specialists are included in **Chapters 8** of the EIA Report, as well as the project EMPrs which are attached as **Appendix L** and **M** to the EIA Report. Several renewable energy facilities within a 30km radius of the proposed development have been identified as and are detailed in **Chapter 9** of the EIAr. An assessment of the potential cumulative impacts is included in **Chapter 9** of the EIA Report as well as within the specialist reports included in **Appendix D to J**

➢ The significance rating must also inform the need and desirability of the proposed development. ➢ A cumulative impact environmental statement on whether the proposed development must proceed. (iii) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice. (iv) Please be reminded that section 2(3) of NEMA requires developments to be socially, environmentally and economically sustainable, while section 2(4)(i) of NEMA requires the social, economic and environmental impacts of activities, including disadvantages and benefits, to be considered, assessed and evaluated.	The appointed specialists do not specify contradicting recommendations. All specialist declarations of interest are completed in full and that they are signed and included as **Appendix O** to the EIAr.
(i)	The generic substation EMPr is included as **Appendix M** to the EIA Report. Section C of the EMPr includes specific mitigation measures identified in the EIA Report and specialist reports. There are no overhead power lines associated with the proposed project. The Electrical Grid Infrastructure for the project is assessed within a separate EIA process. The mitigation measures provided by the specialist and incorporated into the EIAr have been included in the EMPr. The EMPr has been completed in accordance with Appendix 4 of the EIA Regulations, 2014, as amended. A recommended frequency has been included in the EMPr.
General	

(ii) The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. (iii) Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies must be indicated. (iv) Confirmation of the availability of services (e.g., sewage, water etc. if required) must be included in the EIAr. (v) Should a Water Use License be required, proof of application for a license needs to be submitted. The applicant is hereby reminded to comply with the requirements of Regulation 45 of GN R982 of 04 December 2014, as amended, with regard to the time period allowed for complying with the requirements of the Regulations.	The technical details of the project have been included in Section 2 of the Draft EIAr. Refurbishment of the site with the reusing of as many viable parts as possible for power generation activities to continue for another 25 years Once the environmental impact process has been completed, the applicant will register a borehole for water use. The nearest drainage system is located is approximately 800m of the project site, therefore a water use license will not be applied for and the provision of proof of application is not applicable.

6.5 Overview of the EIA Phase

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

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

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

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

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

In terms of GNR 779 of 1 July 2016, the National DFFE has been determined as the competent authority for all projects which relate to the IRP and any updates thereto. As the project is proposed within North West Province, the North West DEDECT is the provincial commenting 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 DFFE on **28 April 2022** and the proposed Public Participation Plan. Following submission of the PP Plan, the DFFE advised that the public participation

plan has been cancelled as of the 01st of May 2022, via email on 05 May 2022, and that no pre-application meeting was considered necessary.

- Submission of the Application for Environmental Authorisation to the DFFE via the use of the DFFE Novell Filr System on **22 June 2022**.
- 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.
- Submission of a Final Scoping Report on **05 August 2022**.
- Receipt of acceptance of the Scoping Report and approval of the Plan of Study for the EIA Phase on **16 September 2022**.
- Request for extension of the regulated timeframe in terms of Regulation 23(1) of the 2014 EIA Regulations (GNR 326) on **08 November 2022**. A 60-day extension was granted on **06 December 2022**.

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

- Make the draft EIA Report available for a 30-day public review and comment period from **20 January 2022** to **20 February 2022**.
- Notification and consultation with stakeholders, I&APs and Organs of State that may have jurisdiction over the project, including provincial and local government departments, and State-Owned Enterprises.
- Incorporating comments received during the 30-day public review and comment period into the final EIA Report.
- Submission of the final EIA Report to DFFE for decision making.

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

6.5.2 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). The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GN R326) (as amended) and is being followed for this proposed project.

The Public Participation Process for Kiara PV3 Facility has been undertaken concurrently with that for Kiara PV1, Kiara PV2, Kiara PV3, Kiara PV5, Kiara PV6 and Kiara PV7, located in close proximity to each other. The benefit to the stakeholder is that all information relevant to all related applications has been made available for review together, and not only for comments to be raised across the seven applications at one time, but also provided a complete picture of the potential for impacts and/or benefits related to the suite of projects located in close proximity to one another.

A consultation process has been designed and implemented by Savannah Environmental to ensure that I&APs are afforded sufficient opportunity to access project information and raise comments on the project through an interactive web-based platform (i.e. online stakeholder engagement platform) readily available and accessible to any person registering their interest in the project, and ensures that the public participation

process is undertaken in line with Regulations 41 to 44 of the EIA Regulations, 2014 as amended. The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the EIA process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding the EIA process in the following ways:

- During the **Scoping Phase**:
  - provide an opportunity to submit comments regarding the project;
  - assist in identifying reasonable and feasible alternatives, where required;
  - identify potential issues of concern and suggestions for mitigation measures
  - 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.

The Public Participation process therefore aims to ensure that:
- Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs for their review.

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

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

i. Advertisements and Notifications

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

- Notification letter distributed to all registered parties advising them of the availability of the EIA Report for review on comment on **20 January 2023.**
- An advertisement announcing the availability of and inviting comment on the EIA Report in the 'Die Noordwester' on **20 January 2023**. A copy of the newspaper advert as sent to the newspaper is included an **Appendix C2** of the EIA Report. The advert tear sheet will be included in the final EIA Report as **Appendix C2**.
- The EIA Report is available for review and comment by I&APs for a 30-day period from **20 January** to **20 February 2023**. The EIA Report is available on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/). I&APs will be encouraged to review the EIA Report and submit written comment. The EIA Report will be circulated to Organs of State via electronic transfer (Dropbox, WeTransfer, etc), or CD and/or hardcopy as per individual request. Evidence of distribution of the EIA Report will be included in the final EIA Report as **Appendix C4** and **Appendix C5**.

ii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the surrounding area, as well as capture their views, comments, issues and concerns regarding the project, various opportunities 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:

- Opportunity to review the EIA Report for a 30-day review and comment period from **20 January 2023** to **20 February 2023**.
- Comments received during this review period will be captured within a Comments and Responses Report (**Appendix C9**), which will be included within the final EIA Report.
- Focus group meetings: Virtual focus group meetings with key government departments, stakeholders and landowners. The purpose of these focus group meetings will be to provide an overview of the findings of the EIA studies in order to facilitate comments on the EIA process and EIA Report, as well as to record any issues or concerns raised by stakeholders regarding the project. Where necessary or

required, face-to-face meetings will be held. The minutes of these meetings will be included in the final EIA Report as **Appendix C7**.

» Telephonic consultation sessions.
» Written, faxed or e-mail correspondence.

Table 6.6: Public involvement for Kiara PV3 Facility

Activity	Date
Advertising of the availability of the EIA Report for a 30-day review and comment period in the 'Die Noordwester'.	20 January 2023
Distribution of notification letters announcing the availability of the EIA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	20 January 2023
30-day review and comment period of the EIA Report.	20 January – 20 February
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners. » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions.	To be undertaken during the 30-day review period for the EIA Report.
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs.	Throughout EIA process

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

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

The EIA Report is available on the Savannah Environmental website (i.e., online stakeholder engagement platform) (https://savannahsa.com/public-documents/energy-generation/). A notification letter to all registered parties was distributed on **20 January 2023.** Where I&APs are not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions and face-to-face discussions will be used.

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

iv. Identification and Recording of Comments

Comments raised by I&APs to date have been synthesised into a Comments and Responses (C&R) Report which has been included in **Appendix C** of the EIA Report. These include written comments received. The

C&R Report I includes a 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.

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

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

6.6 Outcome 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 screening tool report is included in **Appendix M** of the EIA Report. **Table 6.7** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team considering the project site under consideration. A site sensitivity verification report which informed the specialist studies undertaken as part of this process is included in **Appendix J**.

Table 6.7: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of the Kiara PV3 Facility

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural Impact Assessment	High	A Soils and Agricultural Potential Impact Assessment is included in this EIA Report as **Appendix F**.
Landscape/Visual Impact Assessment	Very high	A Visual Impact Assessment has been undertaken for the Kiara PV3 Facility and is included in this EIA Report as **Appendix H.**
Archaeological and Cultural Heritage Impact Assessment	Very High	A full Heritage Impact Assessment (including an assessment of archaeological heritage resources and the cultural landscape) has been undertaken for the Kiara PV3 Facility and is included in this EIA Report as **Appendix G**.
Palaeontology Impact Assessment	Very High	A full Heritage Impact Assessment (including an assessment of archaeological heritage resources and the cultural landscape) has been undertaken for the Kiara PV3 Facility and is included in this EIA Report as **Appendix G**.
Terrestrial Biodiversity Impact Assessment	Very high	A Terrestrial Ecology Impact Assessment has been undertaken for the Kiara PV3 Facility and is included as **Appendix D** of the EIA Report.
Aquatic Biodiversity Impact Assessment	Very high	A Freshwater Impact Assessment has been undertaken for the Kiara PV3 Facility and is included as **Appendix D** of the EIA Report.
Avian Impact Assessment	High	An Avifauna Impact Assessment has been undertaken for the Kiara PV3 Facility and included as **Appendix E** of the EIA Report.

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Civil Aviation Assessment	Low	A Civil Aviation Compliance Statement has been compiled by the EAP (refer to **Appendix N** confirming the low sensitivity of the site. The Civil Aviation Authority will be consulted throughout the EIA process to obtain any relevant comments regarding the proposed project.
Defence Assessment	Low	A defence or military base is not located within close proximity to the PV facility site.
RFI Assessment	Low	The project site under consideration is not located near a telecommunications tower.
Plant Species Assessment	Medium	A Terrestrial Ecology Impact Assessment (including flora) has been undertaken for Kiara PV3 and is included as **Appendix D** of the EIA Report.
Animal Species Assessment	Low	

6.7 Assessment of Issues Identified throughout the EIA Process

Issues (both direct and indirect environmental impacts) associated with the Kiara PV3 Facility identified within the scoping process have been evaluated through specialist studies by specialist consultants. The specialist consultants involved in the assessment of these impacts are indicated in **Table 6.8** below.

Table 6.8: Specialist studies undertaken as part of the EIA Phase

Specialist	Area of Expertise	Refer Appendix
Darius van Rensburg – DPR Ecologists and Environmental Services	Ecology (Terrestrial and Freshwater)	Appendix D
Leigh-Ann de Wet and Andrew Husted – The Biodiversity Company	Avifauna	Appendix E
Marine Pienaar – TerraAfrica	Soils & Agricultural Potential	Appendix F
Jenna Lavin – CTS Heritage	Heritage (including archaeology, cultural landscape and palaeontology)	Appendix G
Lourens du Plessis - LOGIS	Visual	Appendix H
Molatela Ledwaba – Savannah Environmental with external peer review by Tony Barbour	Social	Appendix I

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

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

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

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

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

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

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

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

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

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

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

As the project developer has the responsibility to avoid or minimise impacts and plan for their management (in terms of the requirements of NEMA and the 2014 EIA Regulations (GNR 326)), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. A facility EMPr and a generic substation EMPr that include all the mitigation measures recommended by the specialists for the management of significant impacts are included as **Appendix L and M** to this EIA Report.

6.8 Assumptions and Limitations of the EIA Process

The following assumptions and limitations are applicable to the EIA process of Kiara PV3 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 Kiara PV3 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, BESS and grid connection infrastructure).
- Conclusions of the specialist studies undertaken, and this overall impact assessment assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset in accordance with the relevant recommendations made.

This report and its investigations are project specific, and consequently the environmental team did not evaluate any other power generation alternatives.

6.9 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.

» International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

Several other Acts, standards or guidelines have also informed the project process and the scope of issues addressed and assessed in this EIA Report. A review of legislative requirements applicable to the proposed project is provided in **Table 6.9**.

Table 6.9: Relevant legislative permitting requirements applicable to Kiara PV3 Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* ∗ *Prevent pollution and ecological degradation,* ∗ *Promote conservation, and* ∗ *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.	DFFE – Competent Authority North West DEDECT – Commenting Authority	The listed activities triggered by the proposed project have been identified and are being assessed as part of the EIA process currently underway for the project. Considering the capacity of the proposed Kiara PV3 Facility project (i.e. contracted capacity of 120MW) 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. The EIA process will culminate in the submission of an EIA Report to DFFE for decision-making.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DFFE North West DEDECT – Commenting 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)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DFFE North West DEDECT– Commenting Authority Ditsobotla 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 a GA, or if a responsible authority waives the need for a licence.	Regional Department of Water and Sanitation	An Ecological Impact Assessment (including freshwater) has been undertaken for the PV facility and is included as **Appendix D** of the EIA Report.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).		The area is largely devoid of surface drainage lines, watercourses, and wetlands. However, a large drainage area is situated in the central portion of the study area. The drainage area is the main, and only, surface water feature in the study area. The drainage area is strictly ephemeral and will only contain surface water during years of exceptional rainfall. It is unlikely that it will ever contain any surface flow but may contain periodic surface water. It also does not fit the definition of a watercourse, does not contain a channel and is also devoid of any distinctive riparian vegetation. However, toward the eastern end of the study area, some small depressions do become evident, indicating shallow groundwater table and confirming that the drainage does form a surface water feature. The condition of the drainage area will be determined from this wetland depression portion and inferred from this for the surrounding section of the drainage area. Should these resources be impacted by the project, a Water Use Authorisation would be required.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy (DMRE)	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.		In terms of Section 53 of the MPRDA approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.	North West DEDECT / Ngaka Modiri Molema District Municipality	In the event that the project results in the generation of excessive levels of dust the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.	South African Heritage Resources Agency (SAHRA) North West Provincial Heritage Resource Agency) – provincial heritage authority	A Heritage Impact Assessment has been undertaken for the project as per the requirements Section 38 of the NHRA. The Heritage Impact Assessment has been included as **Appendix G** of the EIA Report made available in the EIA Phase. A number of stone structures were identified within the development area. Some of these are indicative of historic occupation of the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		area in the form of ruins, old structures and stone kraals. These have been graded as having low local significance due to their contribution to the history of the broader context. Other such features represent burials and burial grounds. These features have high levels of local significance and may not be impacted by the development activities. Should a heritage resource be impacted upon, a permit may be required from SAHRA or North West Provincial Heritage Resource Agency (NW PHRA) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing	DFFE North West DEDECT	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. No Red Listed plant species could be identified on the site and the area is also not known to contain many such species though a few are still present in this region and a likelihood therefore remains that such a species may also be present on the site. A few rocky areas occurring in Kiara PV3 of the development and is notably higher in terms of species diversity and protected plant species. These include the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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).		protected succulent and geophytic species, Babiana bainesii, Gladiolus cf. elliottii, Euphorbie davyi, Orbea lutea subsp. lutea and Pellaea calomelanos. Where development will affect these species, the necessary permits should be obtained and a significant proportion of these transplanted to adjacent areas where they will remain unaffected
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DFFE North West DEDECT	An Ecological Impact Assessment (including fauna, flora and freshwater) has been undertaken for the PV facility and is included as **Appendix D** of the EIA Report. No presence of any alien plant species was recorded during the site survey.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.	Department of Agriculture, Rural Development, and Land Reform (DARDLR)	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented. In terms of Regulation 15E (GN R1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods:

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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. 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.	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of Kiara PV3 Facility, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the DoH.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	» Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste.	DFFE – Hazardous Waste North West DEDECT – General Waste	No waste listed activities are triggered by Kiara PV3 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.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	» 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.		
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	South African National Roads Agency (SANRAL) – national roads North West Department of Public Works and Roads (NWDPWR)	An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally dimensioned loads and transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation and BESS components may not meet specified dimensional limitations (height and width) which will require a permit.
Provincial Policies / Legislation			
Bophuthatswana Nature Conservation Act. No. 3 of 1973.	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	North West DEDECT	A collection/destruction permit must be obtained from North West Department of Rural, Environment and Agricultural Development for the removal of any

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Act provides lists of protected species for the Province.		protected plant or animal species found on site. During the site survey no plant SCC were recorded (Refer to the Ecological Impact Assessment (**Appendix D**)). The impacts will be further assessed during the EIA phase.

6.9.1 Best Practice Guidelines Birds & Solar Energy (2017)

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

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

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

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

Data collection could vary from a single, short field visit (Regime 1, for e.g. at a small or medium sized site with low avifaunal sensitivity), to a series of multi-day survey periods, including the collection of various forms of data describing avian abundance, distribution and movement and spread over 12 months (Regime 3, for e.g. at a large developments located in a sensitive habitat, or which otherwise may have significant impacts on avifauna). **Table 6.6** is taken from the best practise guidelines and provides a summary of the recommended assessment regimes in relation to proposed solar energy technology, project size, and likely risk).

Table 6.6: Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.

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

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

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

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

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

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

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

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

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

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

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, an austral winter season and an austral summer season bird monitoring survey will be conducted in line with Regime 2 for the Kiara PV3 Facility. The austral winter season survey has already been conducted; the findings has been used to inform the avifauna scoping report completed for the Scoping phase. The result from the austral summer season survey was used to inform both the development footprint as well as the Avifauna Impact Assessment report, and has been included in the EIA as **Appendix D**

6.9.2 The IFC Environmental Health and Safety (EHS) Guidelines

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

- IFC EHS General Guidelines
- IFC EHS Guidelines for Electric Power Transmission and Distribution

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, however no Industry Sector EHS Guidelines have been developed for PV solar power to date. The application of the General EHS Guidelines should be tailored to the hazards and risks associated with a project, and should take into consideration site-specific variables which may be applicable, such as host country context, assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

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

6.9.3 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. consultating with key authorities, statutory bodies, affected communities and other relevant stakeholders as early as possible).
- Environmental and Social Management Plan (ESMP) (i.e. compile an ESMP to ensure that mitigation measures for relevant impacts are identified and incorporated into project construction procedures and contracts)

CHAPTER 7: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the local environment. This information is provided in order to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, Kiara PV3 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.

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

This chapter includes the following information required in terms of Appendix 3: Content of an Environmental Impact Assessment Report:

Requirement	Relevant Section
3(1)(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	The environmental attributes associated with the proposed development is included as a whole within this chapter. The environmental attributes that are assessed within this chapter includes the following:
	» The regional setting of the broader study area indicates the geographical aspects associated with the proposed project. This is included in **Section 7.2**.
	» The climatic conditions for the Lichtenburg area have been included in **Section 7.3**.
	» The biophysical characteristics of the project site and the surrounding areas are included in **Section 7.4**. The characteristics considered are topography and terrain, geology, soils and agricultural potential and the ecological profile which includes the vegetation patterns, listed plant species, critical biodiversity areas and broad-scale processes, freshwater resources, terrestrial fauna and avifauna.
	» The heritage and cultural aspects (including archaeology, cultural landscape and palaeontology) has been included in **Section 7.5**.
	» The social and socio-economic characteristics associated with the broader study area and the project site has been included in **Section 7.6**
	» The visual quality, land-use and settlement patterns of the affected environment has been included in **Section 7.7**
	The current traffic conditions for the area surrounding the project have been included in **Section 8.8**

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

7.2. Regional Setting

The Kiara PV3 Facility development area is located approximately 16km north-east of the town of Lichtenburg within the Ditsobotla Local Municipality and the Ngaka Modiri Molema District Municipality in the North West Province.

The North West Province is situated in the central-northern extent of South Africa. The province is bordered by Northern Cape Province to the west, and south-west; Free State Province to the south; Gauteng Province to the east; Limpopo Province to the north-east; and Botswana to the north. It occupies an area of land approximately 104 882km² in extent, making it South Africa's 6th largest in terms of area; and has a population of 3 509 953 (2011) and population density of 33/km² (2011), making it South Africa's 7th most densely populated Province.

The North West Province is characterised by altitudes ranging from 920 - 1782m amsl, which makes it one of the provinces with the most uniform terrain. The central and western extents of the province are characterised by gently undulating plains, while the eastern extent is characterised as mountainous, and includes the Magaliesberg mountain range. Ancient igneous rock formations dominate the north-eastern and north-central extent of the province; and the Gatsrand between Potchefstroom and Carletonville is considered to be one of the most ancient, preserved landscapes in the world. The geology of the province is significant given its mineral resources which are rich in platinum, gold, uranium, iron, chrome, manganese, and diamonds.

In terms of land use patterns, approximately 69% of the North West Province is in a natural, or near-natural state; while 31% of the province is irreversibly modified as a result of croplands (25.6%), urban (3.5%), and mining (0.7%) activities. The province is predominantly rural with the main economic activities comprising mining and agriculture. The North West Province comprises 4 Districts, namely Bojanala Platinum, Ngaka Modiri Molema, Dr Ruth Segomotsi Mompati, and Dr Kenneth Kaunda (**refer to Figure 7.1**)

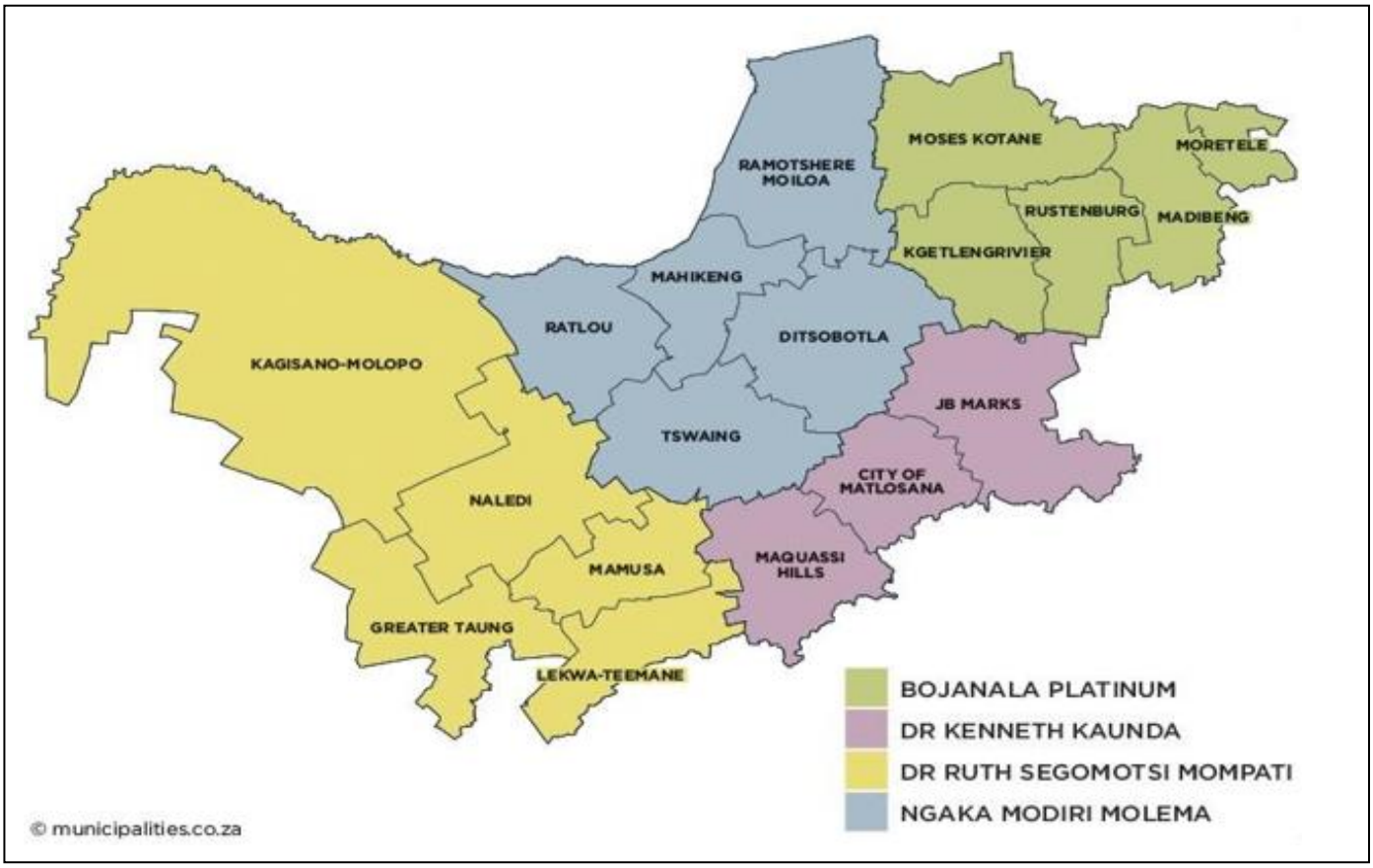


Figure 7.1 Map showing the municipalities of the North West (Source: www.municipalities.co.za).

The Ngaka Modiri Molema District Municipality is a Category C municipality and one of four district municipalities in the North West Province. It is situated centrally within the province and shares an international border with Botswana. It is comprised of five local municipalities: Mahikeng, Ratlou, Ramotshere Moiloa, Ditsobotla and Tswaing. The district is home to Mahikeng (previously Mafikeng), the capital of the province. Aptly named, the capital is nicknamed 'The City of Goodwill', which is also the city's slogan. It is a rapidly growing, modern, residential, administrative and commercial town, which contrasts with its fascinating history. The main economic sectors of the district include agriculture, tourism and mining. **Figure 7.2** below illustrates the local municipalities that make up the district.

Figure 7.2 Map showing the Ngaka Modiri Molema District Municipality and local municipalities including the Ditsobotla local municipality (Source: www.municipalities.co.za).

The Ditsobotla Local Municipality is a category B local municipality. It is one of the five municipalities in the district, making up almost a quarter of its geographical area. The seat of the local municipality is Lichtenburg. The municipality was established through the amalgamation of the former Lichtenburg, Coligny and Biesiesvlei Transitional Councils. Its main attractions are cultural, heritage and agricultural museums; the burning vlei – a unique vlei consisting of the thick layers of subterranean peat that burnt for years, creating a rare natural phenomenon; the Lichtenburg Game Breeding Centre; Eufees and Duch Roode Dams, situated between the CBD and Burgersdorp; and Molopo Oog/Wondergat.

7.3. Climatic Conditions

The Lichtenburg area is typically characterised as having a moderate to cold semi-arid climate with wide variations in daily and seasonal temperatures. The area is typically hot in summer and mild-to-cold in winter. The area receives a mean annual average rainfall of approximately 601mm. Precipitation is highest in January with an average of 110mm; and lowest in July and August with an average of 5mm. Minimal rain occurs between May to September. The average annual temperature in Lichtenburg is 16.9°C. January is the hottest month of the year with an average temperature of 21.7°C, while June is the coldest month of the year with an average temperature of 9.9°C (refer to **Figure 7.3** and Error! Reference source not found.**.1**). F rost is frequent to very frequent during winter, with up to 37 mean frost days per year. Droughts and floods are a regular occurrence at both provincial and local scales and play a significant role in almost every aspect of the social, economic, and ecological environment within the province.

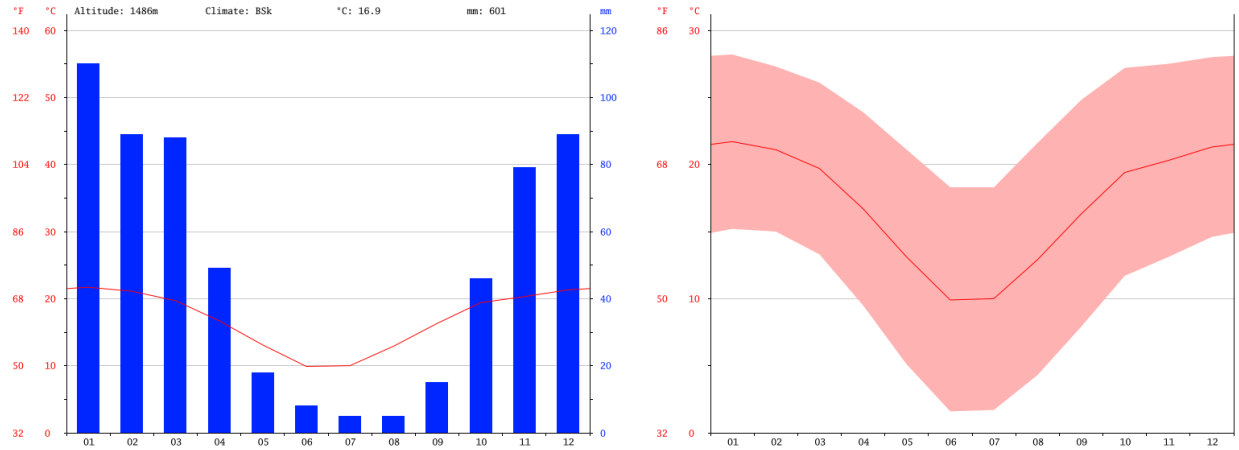


Figure 7.3 Climate and Temperature graphs for Lichtenburg, North West Province (Source: en.climate-data.org).

Table 7.1 Climate data for Lichtenburg, North West Province (Source: en.climate-data.org).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Temp. (˚C)	21.7	21.1	19.7	16.7	13.1	9.9	10	12.9	16.3	19.4	20.3	21.3
Minimum Temp. (˚C)	15.2	15	13.3	9.5	5.1	1.6	1.7	4.3	7.9	11.7	13.1	14.6
Maximum Temp. (˚C)	28.2	27.3	26.1	23.9	21.1	18.3	18.3	21.6	24.8	27.2	27.5	28
Precipitation (mm)	110	89	88	49	18	8	5	5	15	46	79	89

7.4. 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 EIA Report.

7.4.1. Topographical profile

The topography or terrain morphology of the region is broadly described as Plains and Pans or Slightly Undulating Plains of the Central Interior Plain. The slope of the entire study area is extremely even (flat) with slight undulations of no more than 5m. The altitude of the study area varies from 1520 m AMSL on the slightly higher lying areas to 1511 m AMSL in the lower lying in the northern portion of the site. This represents a difference of 8 m which indicates and confirms a fairly flat area.

7.4.2. Geology, Soils and Agricultural Potential

Geology Setting of the Project area

According to the extract from the Council of Geoscience Map for the West Rand, the proposed development is located on geological deposits belonging to the Monte Christo Formation of the Chuniespoort Group (refer to **Figure 7.4**). Bamford (2018) noted that the study site is in the Malmani Subgroup which contains a number of stromatolitic dolomites. These were formed in warm shallow sea and are the accumulation of layer upon layer of minerals deposited by blue-green algae (also known as cyanobacteria) and rarely some filamentous algae. Minerals deposited by the algae include calcium carbonate, calcium sulphate and magnesium carbonate. Very rarely are the algal cells preserved in the stromatolites and these are microscopic. Stromatolites are essentially trace fossils and these ones are 2750 to 2650 million years old and very abundant. 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 much too old to contain fossils other than blue-green algae.

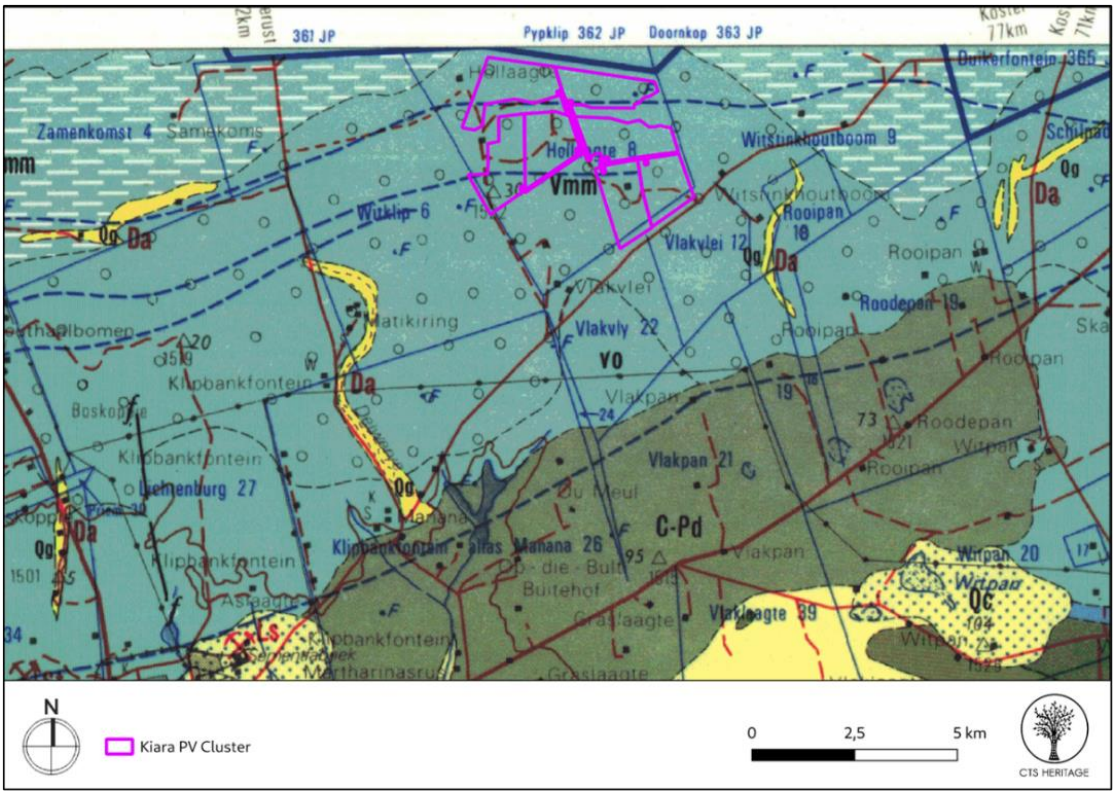


Figure 7.4 Geology Map. Extract from the CGS 2626 West Rand Map indicating that the development area for the Kiara Cluster PV Facilities is underlain by sediments of the Monte Christo Formation assigned to the Chuniespoort group, within the Malmani Subgroup (Vmm)

Soil properties

The soil profiles classified within the Kiara PV3 development area consist of the Hutton, Glenrosa and Mispah soil forms. Below follows a description of each of the soil forms identified.

Mispah soils

The Mispah souls are the dominant soils of the area. The Mispah soils are very shallow, ranging un effective depth between 0.05 and 0.30m. The Mispach soils consist of orthic topsoil (mostly bleached) that covers fractured and solid rock. In some areas, solid rock is visible on the surface as rock outcrops.

Figure 7.5 Photographic evidence of a Mispah soil profile within the development footprint

Glenrosa soils

One area of Glenrosa soils is present in the middle of the northern boundary of the development area. The average effective depth of the Glenrosa soils range in depth between 0.10m and 0.30m and consist of orthic topsoil horizons that are either bleached or chromic (light red in colour) with lithic material underneath. The lithic horizon of the Glenrosa soils within the Kiara PV3 development footprint area belongs to the geolithic family and consists of soil material as illuvial infillings between partly weathered and fractured rock (Soil Classification Working Group, 2018).

Figure 7.6 Hutton soils within the Kiara Phase 1 development area

Hutton soils

One area of Hutton soils is present in the middle of the development area. This soil form consists of chromic (red) topsoil with sandy-loam texture that overlies a deep red apedal horizon. The red apedal horizon is deeper than 1.5m.

Land Capability

The position of the different land capability classes within the development area are depicted in **Figure 7.7**. The largest part of the Kiara PV3 development area consists of land with Low-Moderate to Moderate (Class 06 and 07) land capability. This land capability class is present within the entire boundary of the development area while smaller areas of land Moderate (Class 08) are scattered in between. A small section of land with Moderate-High (Class 09) land capability is located along the western part of the northern boundary.

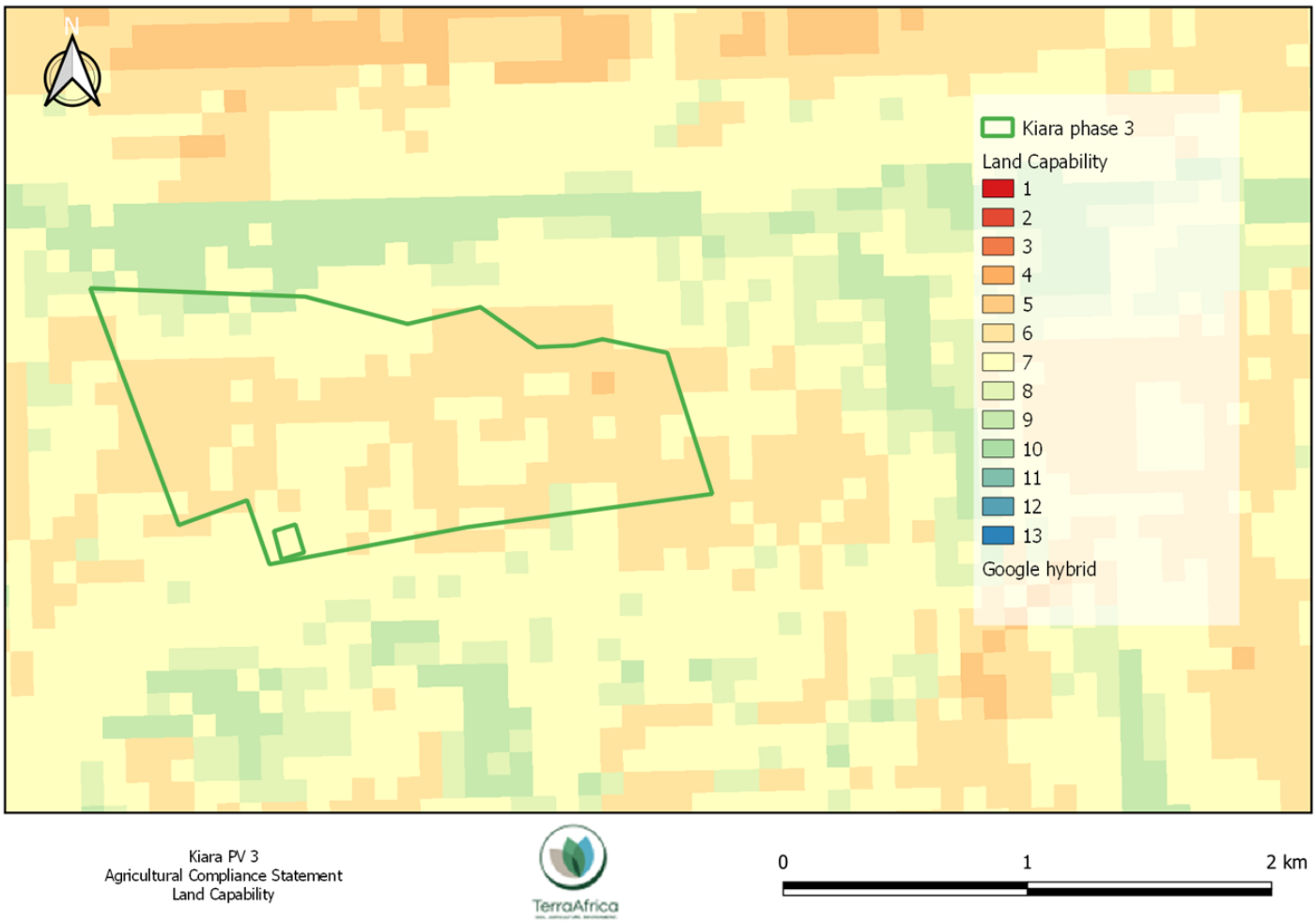


Figure 7.7 Land capability classification of the Kiara PV3 development area (data source: DALRRD, 2016)

Agricultural Potential

Following the classification of the soil and the consideration of the soil properties and limiting factors to rainfed crop production, the agricultural potential soil within the development area was determined. The agricultural potential of the area is depicted in **Figure 7.8.**

The largest part of the total area assessed, has Low agricultural potential (172ha). Low agricultural potential has been assigned to soils of the Mispah and Glenrosa forms because of the shallow soil depth. The high agricultural potential is allocated to the Huttton soil form due to its deep soil depth and was found in the middle of the study area (4ha). The low agricultural potential of the soils within the development area is confirmed by the absence of crop field boundaries within the Kiara PV3 development area. The only agricultural land use within the development area, is livestock farming.

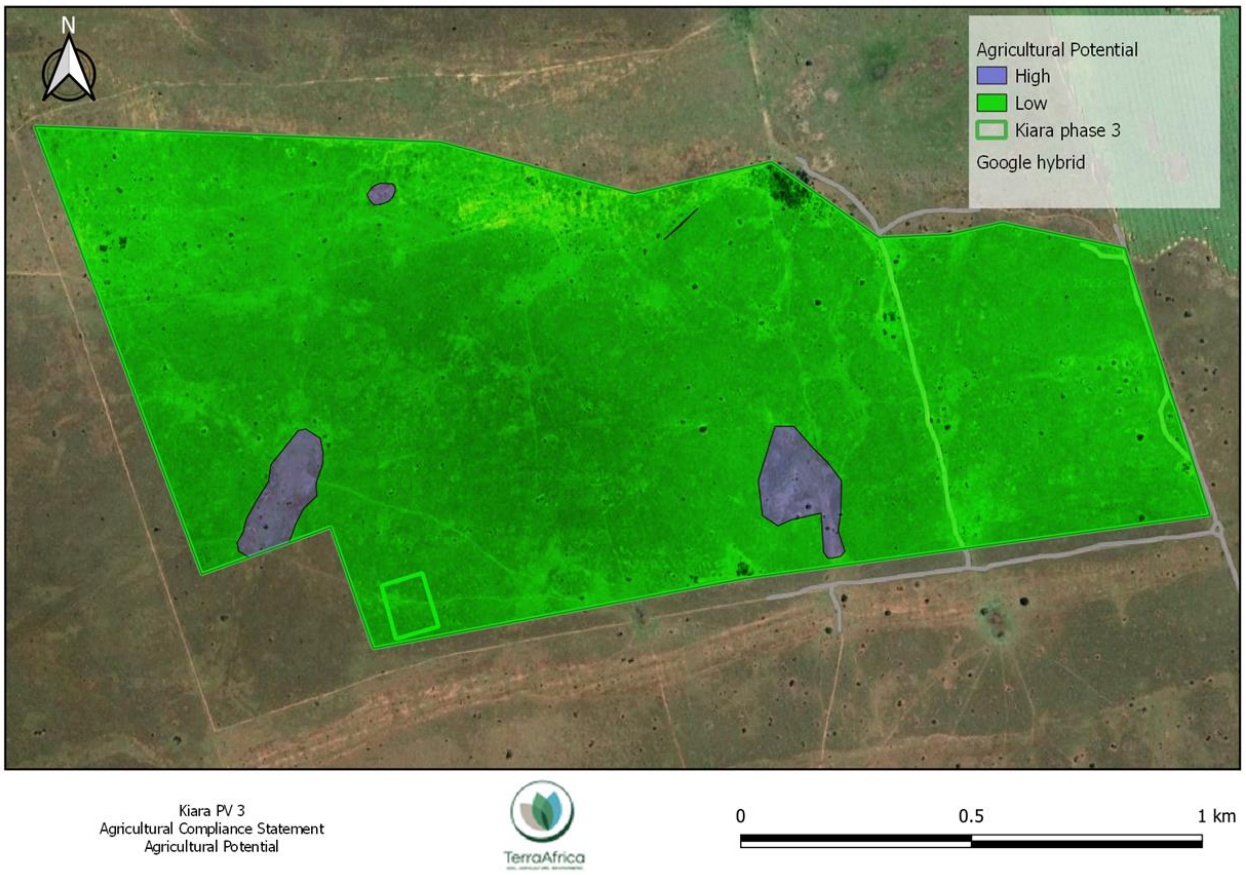


Figure 7.8 Agricultural potential delineation of the proposed Kiara PV3 development area

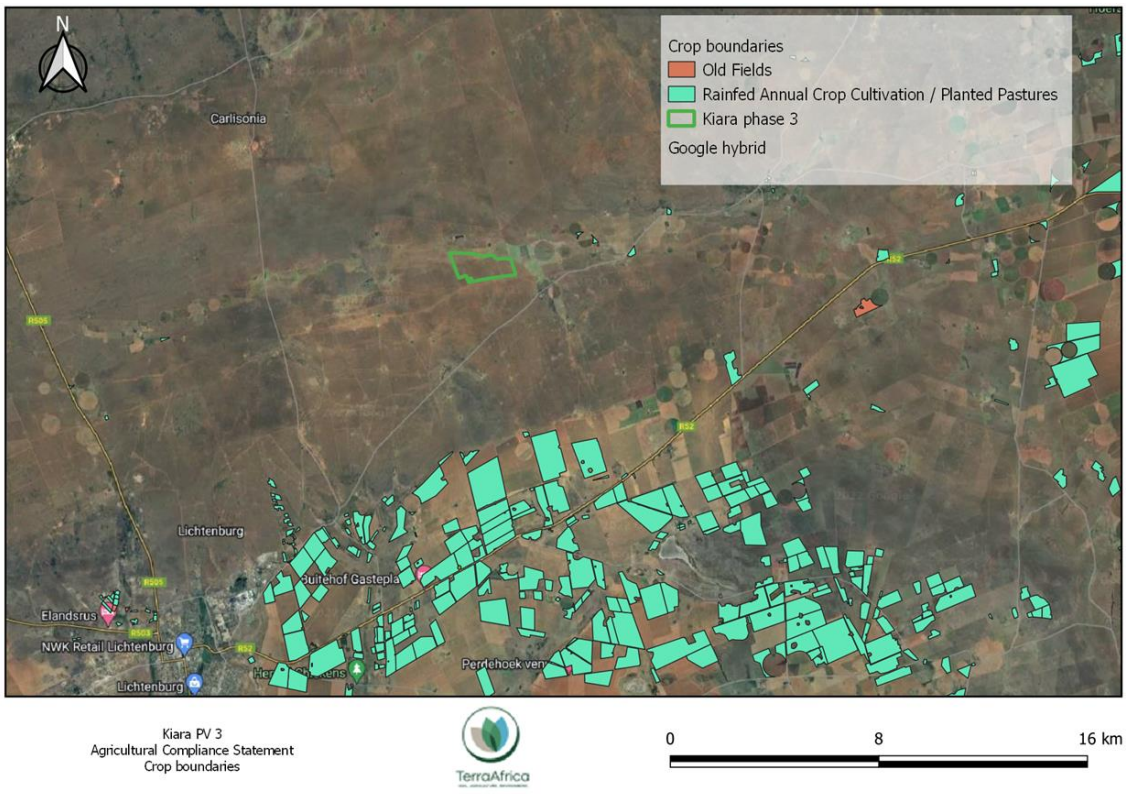


Figure 7.9 Location of field crop boundaries around the proposed Kiara PV3 development area (data source: DALRRD, 2019)

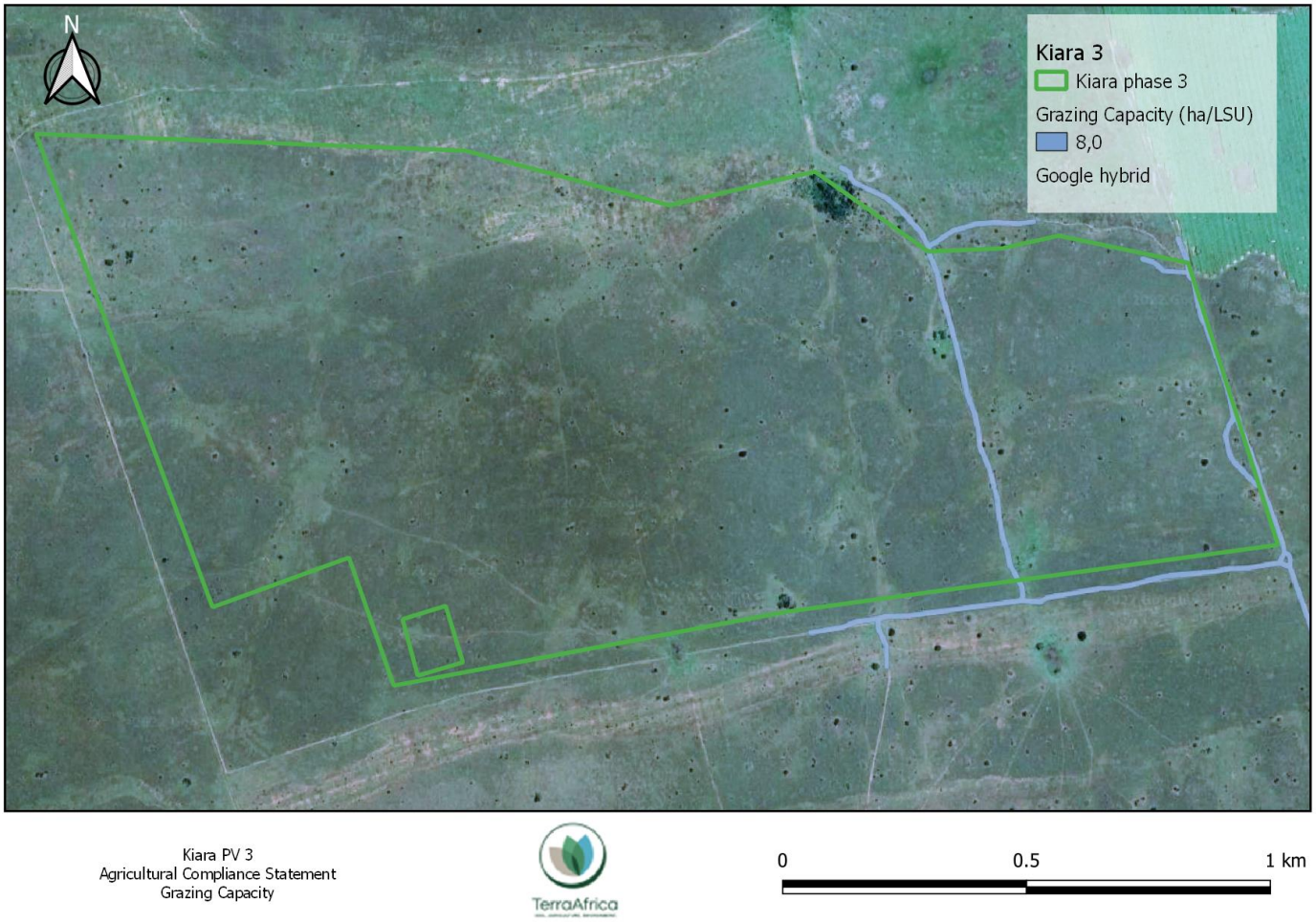


Figure 7.10 Grazing capacity of the Proposed Kiara PV3 (data source: DALRRD, 2018)

Following the metadata layer obtained from DALRRD, the long-term grazing capacity of the entire project area is 8 ha/LSU. The ideal grazing capacity is an indication of the long-term production potential of the vegetation layer growing in an area. More specifically, it relates to its ability to maintain an animal with an average weight of 450 kg (defined as 1 Large Stock Unit (LSU)), with an average feed intake of 10 kg dry mass per day over the period of approximately a year. This definition includes the condition that this feed consumption should also prevent the degradation of the soil and the vegetation. The grazing capacity is therefore expressed in a number of hectares per LSU (ha/LSU) (DALRRD, 2018).

Using the long-term grazing capacity of 8ha/LSU, the Kiara PV3 development area of 195 ha can provide forage to 22 head of cattle. The grazing capacity is moderate in comparison to the grazing capacity of the rest of the country. During the site visit, livestock watering troughs were observed.

Figure 7.11 Photographic example of vegetation and windpump within the study area

7.4.4. Ecological Profile of the Study Area and the project site

i. Broad-Scale Vegetation Patterns

The study area is relatively uniform and dominated by grassy, undulating plains. However, because there is some variation in soil depth, slope and the degree of surface rock the study area does exhibit a habitat mosaic of plant diversity and species composition. According to Mucina & Rutherford (2006), the study area consists exclusively of Carletonville Dolomite Grassland (Gh15).

Carletonville Dolomite Grassland (Gh 15)

According to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) this vegetation type is currently listed as being of Least Concern (LC). Although it is in some instances heavily affected by crop cultivation and mining this is not yet considered to be to such an extent as to warrant it being considered a Threatened Ecosystem. It will therefore, in general have a moderate conservation value. The survey of the study area also confirmed that this vegetation type corresponds well with the topography and geology of the site.

The vegetation is largely natural with only local modifications and is overall in a fairly good condition. Some local disturbances are present, especially where historical ploughing had taken place. It is however evident that very few exotic weeds and invasive species occur in the study area, also confirming the relatively good condition of the ecosystem. Even those areas previously ploughed are also largely devoid of exotic weeds and also indicated that though disturbed, they have again become largely natural and stable.

The study area is dominated by undulating grassy plains and which contain a significant diversity of grass species. These include *Cymbopogon pospischillii, Themeda triandra, Heteropogon contortus, Eragrostis curvula, Hyparrhenia hirta, Loudetia simplex, Eragrostis superba, Triraphis andropognoides, Anthephora*

pubescens, Eragrostis gummiflua, Aristida congesta, Trachypogon spicatus, Urelytrum agropyroides, Trichoneura grandiglumis, Sporobolus fimbriatus and Elionurus muticus. This is notably quite a high grass diversity, which is also a characteristic of this vegetation type and also a consequence of the variety in soil depth and degree of rocky outcrop. The majority of these are climax species indicating a fairly good condition though some pioneer grasses were also noted where disturbance was higher.

Imbedded within this dense grass layer is also a prominent herbaceous component which includes *speciessuch* as *Dicoma macrocephala*, *Helichrysum caespititum, Anthospermum rigidum, Senecio latifolius, Blepharis angusta, Helichrysum callicomum, Polygala hottentotta, Gerbera piloselloides, Hermannia depressa, Monsonia angustifolia, Hermannia tomento* and *Barleria macrostegia*. This is considered a natural component of the vegetation type. Where disturbance is evident such as along dirt tracks, stock watering points and other localised areas of general disturbance, a few pioneer herbs are also evident. These include *Sesamum triphyllum, Hypocharis radicata,* Helichrysum *argyrosphaerum, Nidorella hottentottica, Acrotome inflata* and *Gazania krebsiana*. This is however also a natural occurrence in the vegetation type though is more pronounced in areas of disturbance. It therefore still indicates natural vegetation in fairly good condition.

The study area also contained a prominent element of geophytic species, i.e. plants with an underground storage organ. These include plants such as *Oxalis depressa, Boophone distichia, Babiana bainesii, Ledebouria revoluta, Eriospermum porphyrium, Hypoxis hemerocalidae, Schizocarpus nervosus, Trachyandra laxa, Moraea pallida, Colchicum burkei, Hypoxis rigidula* and *Gladiolus cf. elliottii.* Though these are all generally widespread, *B. bainesii* and *G. cf. elliottii* are protected species and it remains possible that other protected species may also still be present in the area. As previously indicated, the vegetation type in the area also contains scattered, but a characteristic tree and shrub component which also includes *Searsia lancea, Searsia pyroides, Celtis africana, Gymnosporia buxiifolia, Ziziphus mucronata, Grewia flava, Ehretia rigida, Vachellia tortillis, Vachellia karroo, Senegalia caffra* and *Diospyros lycioides*. This tree/shrub component also provides opportunity for a few climbers to establish underneath them and includes species such as Clematic brachiata, Clematis villosa subsp. stanleyi and Pergularia daemia. Another vegetation element which was evident in the vegetation layer included a few *suffrutices* (plants with an extensive belowground stem network) and include *Parinari* capensis and *Ziziphus Zeyheriana.*

Figure 7.12 Panorama of the study area which illustrates a fairly uniform grass layer with scattered trees and shrubs.

Figure 7.13 Panorama of the study area indicating a grass dominated landscape and without a diversity of different habitats.

Figure 7.14 Though a well-developed grass layer dominated the area, scattered trees and shrubs are also characteristic of the vegetation type

As previously indicated a patchwork of historical ploughing is also present in the study area and still visible on aerial photos as lines and patches in the landscape. These have now become re-integrated into the surrounding grassland and are no longer as clearly visible while the species composition here is also now quite similar to the surroundings. Some areas do however still indicate significant disturbance where pioneer species are abundant, and the vegetation cover is somewhat lower than the surroundings. In these areas, pioneer grasses are also more abundant including *Melinis nerviglumis* and *Aristida congesta* while exotic weeds may also be more prominent such as *Datura ferox and Schkuhria pinata.*

There are also a few farmsteads and livestock enclosures where disturbance and transformation are present, and it is prominent that several exotic and invasive plant species are the remnants of this transformation. These include invasive succulent plants such as *Cereus jamacaru* and *Cyllindropuntia* imbricata as well as

a few invasive tree species such as *Eucalyptus camaldulensis, Melia azedarach* and *Gleditsia triacanthos*. A variety of weeds are also present around these areas which include *Alternanthera pungens, Bidens bipinnata* and *Xanthium spinosum*. These areas are clearly transformed but only occur in small, localised areas of the study area.

Figure 7.15 Areas where historical ploughing had taken place are not readily distinguishable from the surroundings though a somewhat lower vegetation cover (red) is still present in these areas and rock piles (yellow) also indicate where areas were cleared for cultivation.

Rocky habitats:

As indicated, rocky areas are quite common over the study and was also evident in the Kiara PV3 development area. These rocky areas do provide additional habitat which is more specialised and as a result does contribute toward an increased species diversity. This also presents a more arid habitat which provides for the establishment of more specialised succulent plants and other growth forms. A prominent succulent component therefore includes species such as *Aloe greatheadii, Anacampseros filamentosa subsp. filamentosa, Crassula lanceolata subsp. transvaalensis, Crassula capitella and Othonna oxyriifolius*. Other specialised growth forms also include the *terestrial fern*, *Pellaea calomelanos*, lithophilic (rock-loving) herbs such as *Senecio coronatus, Justicia anagalloides, Striga elegans, Pelargonium dolomiticum, Blepharis angusta* and *Triumfetta sonderi* and other lithophilic grass species such as *Sporobolus discosporus* and *Oropetium capense*. The sedge, *Bulbostylis burchellii* is also quite characteristic of these rocky areas. These rocky areas may also contain protected species, and which will then require suitable mitigation which will involve either removing or transplanting of affected plants.

These rocky areas occur throughout the study area, including the footprint of Kaira PV3 of the development and it as notable that some of these were significantly higher in terms of species diversity and protected plant species. In general, these rocky areas also contribute toward a higher species diversity and in the case of Kiara PV3 also contains uncommon, protected species with a higher conservation value. Such species included the uncommon succulent, Euphorbia davyi and protected succulent, Orbea lutea subsp. lutea. These are in addition to the diversity of species listed in the previous paragraph. Owing to the higher diversity of some of these rocky areas as well as the presence of plant species which are protected and less common, a few of these areas have been designated as having a High level of sensitivity. They therefore have a significant conservation value and it is recommended that at last a portion (approximately 50 %) of these identified rocky areas be excluded from the development in order to conserve a representative sample of these areas of higher diversity which will then also by default conserve the protected species located in these areas. It will however still be necessary to obtain permits and transplant any affected protected species. The portion of these rocky areas being excluded and conserved can also be used as a refugia where those protected plants which are being removed can be transplanted to.

Figure 7.17 Kiara PV3 of the development contains rocky habitats with a notably higher plant diversity, also contain less common and protected plant species.

Figure 7.18 Kiara PV3 of the development also contains less common and protected species such as *Euphorbia davyi* (left) and *Orbea lutea subsp. lutea* (right).

Important Taxa in Carletonville Dolomite Grassland:

Based on Mucina and Rutherford's (2006) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant) or are prominent in the landscape within a particular vegetation type.

Important Taxa:

- **Grass species:** *Cymbopogon pospischillii, Themeda triandra, Heteropogon contortus, Eragrostis curvula, Hyparrhenia hirta, Loudetia simplex, Eragrostis superba, Triraphis andropognoides, Anthephora pubescens, Eragrostis gummiflua, Aristida congesta, Trachypogon spicatus, Urelytrum agropyroides, Trichoneura grandiglumis, Sporobolus fimbriatus, Elionurus muticus.*
- **Herbceous:** *Dicoma macrocephala, Helichrysum caespititum, Anthospermum rigidum, Senecio latifolius, Blepharis angusta, Helichrysum callicomum, Polygala hottentotta, Gerbera piloselloides, Hermannia depressa, Monsonia angustifolia, Hermannia tomento, Barleria macrostegia.*
- **Pioneer Herbs:** *Sesamum triphyllum, Hypocharis radicata, Helichrysum argyrosphaerum, Nidorella hottentottica, Acrotome inflata, Gazania krebsiana*.
- **Geophytic Species***: Oxalis depressa, Boophone distichia, Babiana bainesii, Ledebouria revoluta, Eriospermum porphyrium, Hypoxis hemerocalidae, Schizocarpus nervosus, Trachyandra laxa, Moraea pallida, Colchicum burkei, Hypoxis rigidula, Gladiolus cf. elliottii.*
- **Low Shrubs***: Searsia lancea, Searsia pyroides, Celtis africana, Gymnosporia buxiifolia, Ziziphus mucronata, Grewia flava, Ehretia rigida, Vachellia tortillis, Vachellia karroo, Senegalia caffra and Diospyros lycioides, Clematic brachiata, Clematis villosa subsp. Stanleyi, Pergularia daemia.* **Suffrutices:** *Parinari capensis, Ziziphus zeyheriana.*

Figure 7.19 Panorama of the study area indicating a grass dominated landscape and without a diversity of different habitats

ii. National Biodiversity Assessment (NBA) 2018

Remnants of the natural vegetation types in the area indicates that the study area is largely still natural. The natural vegetation type in this area, Carletonville Dolomite Grassland, does contain elements of significant conservation value.

Carletonville Dolomite Grass	Western Highveld Sandy Grass

Figure 7.20 View of the areas of remaining natural vegetation in the study area. The study area is notably still dominated by natural vegetation though note transformation in lower lying areas.

iii. Critical Biodiversity Areas

The key output of a systematic biodiversity plan is a map of biodiversity priority areas. The map delineates Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and areas that have been irreversibly modified from their natural state. The provincial CBA spatial data for the North West Province indicates that a large portion of the study area consists of an Ecological Support Area 1 (ESA) and marginal portion of the proposed grid connection corridor encroaches into a CBA 2 area. **Figure 7.21** shows the development area superimposed on the Terrestrial CBA map.

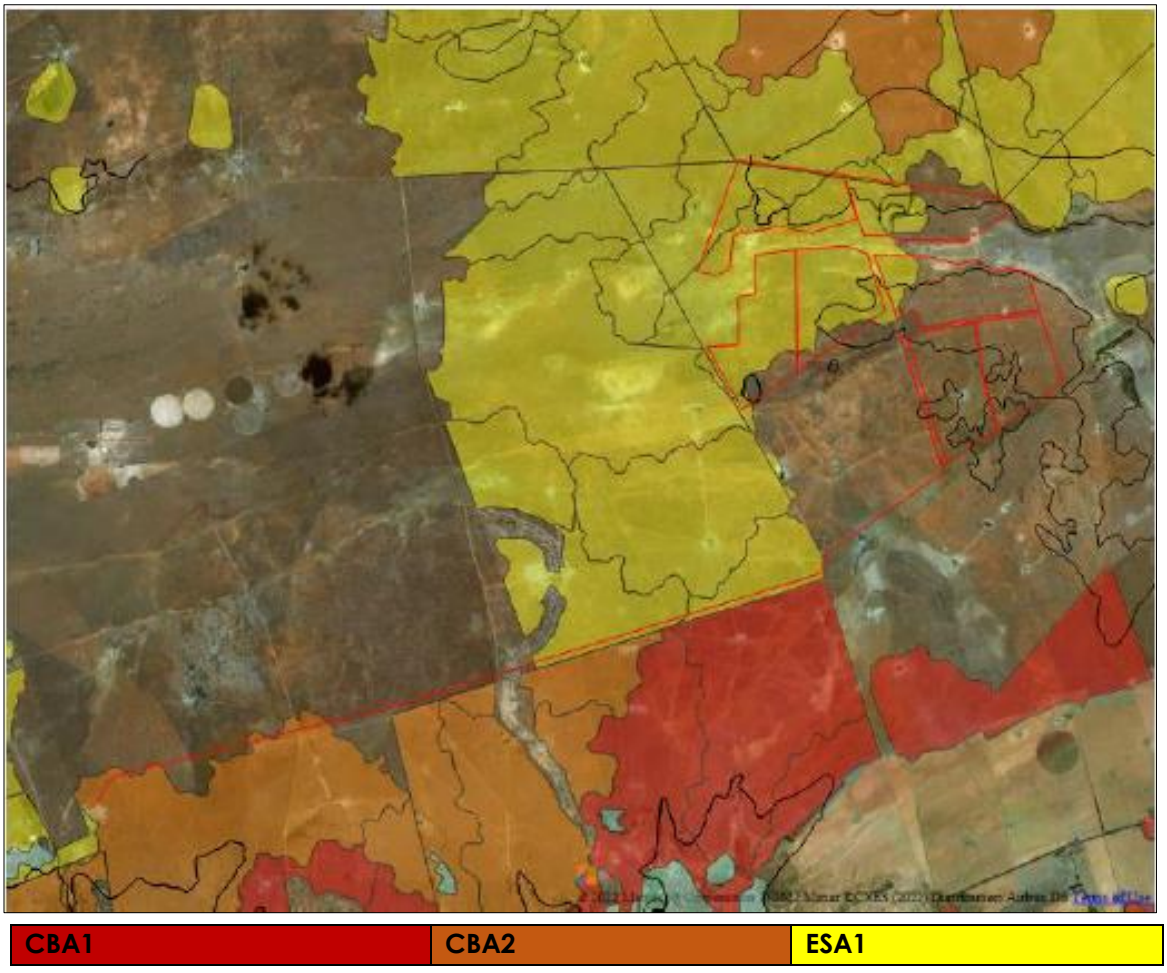


Figure 7.21 Critical Biodiversity Areas (CBAs), as per the North West CBA spatial data, located within the Kiara PV3 project site

iv. National Protected Areas Expansion Strategy (NPAES)

As development increases through time, the expansion of protected areas should also be increased. The NPAES has been developed to identify areas which represent areas of natural vegetation in good condition, with significant diversity and in need of increased conservation. These NPAES Focus Areas therefore represent areas with a significant sensitivity. The study area being considered for development does not contain any NPAES Focus Areas which would otherwise increase the conservation value of the area.

v. Protected Areas

Formally and informally protected areas function in the preservation of natural areas and these areas are normally regarded as having a very high conservation value. The National Environmental Management Protected Areas Act (NEMPAA of 2003) allows for the proclamation of an area as a protected area. The following conservation areas have been identified in this area:

- Lichtenburg Game Breeding Centre – This protected area is located to the west of the study area. It is an informal protected area, i.e. it is not formally protected by the NEMPAA. Despite this, the area will still retain a high conservation value.
- Marico Biosphere Reserve – This protected area borders the study area to the north. A biosphere reserve is a large parcel of land within which the land use is determined by the local society. The protected area should remain unaffected by the proposed development. However, the biosphere reserve should still be consulted during the application process.
- Rall Broers Private Nature Reserve – A private nature reserve is a conservation area governed by the NEMPAA, but which is under private ownership. The protected area is located to the north east of the site and will be irrelevant to the development.

Figure 7.22 View of additional datasets which are relevant to the development. This includes Threatened Ecosystems, NPAES Focus Areas and protected areas.

vi. Ecosystem Threat Status

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) has identified ecosystem which area considered Threatened Ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. Such endangered ecosystems are normally vegetation types which are subjected to severe development pressures, and which will require protected in some form in order to meet conservation targets.

The study area and vegetation type in this area, Carletonville Dolomite Grassland (Gh 15), is not currently subjected to high development pressures, is currently listed as being of Least Concern and therefore not regarded as a Threatened Ecosystem. Western Highveld Sandy Grassland (Gh 14) is currently being subjected to extensive transformation for agricultural crop production and is therefore currently listed as a Critically Endangered system. There are however no remnants of this vegetation type located near the site and is therefore irrelevant for the development.

vii. Wetlands and Freshwater Resources

The area is largely devoid of surface drainage lines, watercourses and wetlands, however, a large drainage area is situated in the central portion of the study area (**Figure 7.23**). The drainage area is the main, and only, surface water feature in the study area. It does not form a defined watercourse though scattered wetland depressions become evident towards the eastern end of the study area and also confirms a shallow groundwater table along this drainage area. Downstream of the site it is also utilised for crop production (indicating deeper soils) while centre-pivot irrigation is also common (confirming it is an important groundwater resource). The section of the drainage area situated on the site had also historically been ploughed for crop production though has not been used for many decades. Consequently, the transformation caused by the ploughing is still evident though somewhat obscured by the re-establishment of vegetation.

The drainage area is situated adjacent and to the south of Kiara PV3 of the development and is therefore likely to be affected by it. The wetland assessment will therefore focus on this system. The drainage area is strictly ephemeral and will only contain surface water during years of exceptional rainfall. It is unlikely that it will ever contain any surface flow but may contain periodic surface water. It also does not fit the definition of a watercourse, does not contain a channel and is also devoid of any distinctive riparian vegetation. However, toward the eastern end of the study area, some small depressions do become evident, indicating shallow groundwater table and confirming that the drainage area does form a surface water feature. The condition of the drainage area will be determined from this wetland depression portion and inferred from this for the surrounding section of the drainage area. This drainage area is also likely to play an important role in terms of groundwater recharge for this area. Especially so since it is regarded as part of the Bo-Molopo Karst Belt Strategic Water Source Area (SWSA) which perform important functions in terms of groundwater resources. The drainage area will be excluded from the development footprint and will therefore not be directly affected by it though the development may still have some indirect impacts on it.

The term watercourse refers to a river, stream, wetland or pan. The National Water Act (NWA, 1998) includes rivers, streams, pans and wetlands in the definition of the term watercourse. This definition follows: Watercourse means:

- A river or spring.
- A natural channel in which water flows regularly or intermittently.

» A wetland, lake or dam into which water flows.
» Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

From the above definition, the drainage area in its entirety may not be regarded as a watercourse, however, the presence of a wetland pan does confirm the presence of some wetland conditions which in turn fits the definition of a watercourse.

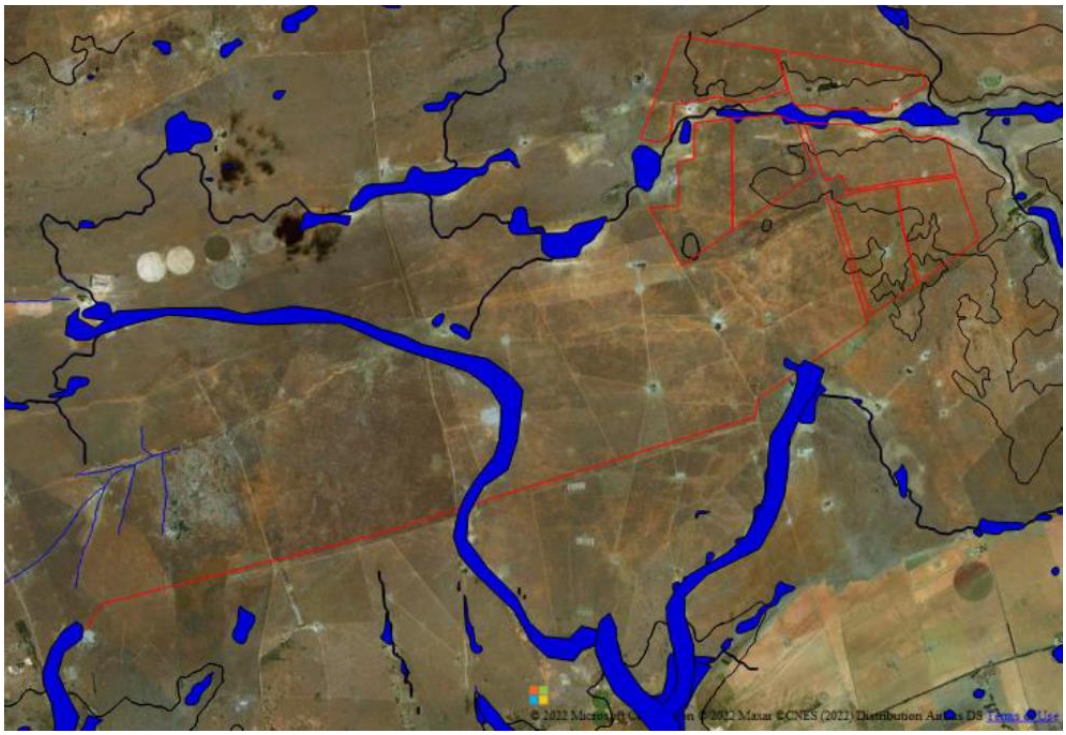


Figure 7.23 View of the wetlands which will be affected by the development. This consists of a wetland system in the northern portion of the development site.

Wetland indicators

Riparian habitat is an accepted indicator of watercourses used to delineate the extent of wetlands, rivers, streams and pans (Department of Water Affairs and Forestry 2005). The drainage area on the site was delineated by use of topography (land form and drainage pattern) and obligate wetland vegetation with limited soil sampling. Due to time constraints and the extent of the study area soil samples were only taken along a few transects of the drainage area to confirm the presence of wetland conditions. The following guidelines and frameworks were used to determine and delineate the watercourses and wetlands in the study area:

» Department of Water Affairs and Forestry. 2005. A practical field procedure for identification and delineation of wetlands and riparian areas. Edition 1. Department of Water Affairs and Forestry, Pretoria.
» Marnewecke & Kotze 1999. Appendix W6: Guidelines for delineation of wetland boundary and wetland zones. In: MacKay (Ed.), H. Resource directed measures for protection of water resources: wetland ecosystems. Department of Water Affairs and Forestry, Pretoria.

Obligate wetland vegetation was utilised to determine the presence and border of wetland conditions. Due to time constraints soil samples were only taken along several lateral transects of the drainage area to

confirm the presence or absence of wetland conditions. Soil samples were investigated for the presence of anaerobic evidence which characterises wetland soils.

The vegetation survey indicated that the drainage area is devoid of both wetland and riparian vegetation and is largely dominated by a combination of pioneer grasses, most likely a consequence of the historical ploughing. Toward the eastern end of the study area, obligate wetland grasses, *Leptochloa fusca*, become prominent in depressions and here wetland conditions are confirmed. In these instances, the soil samples also confirmed the presence of soil wetness indicators. However, for the majority of the drainage area, soils did not conclusively indicate the presence of saturated conditions. The drainage area does however still play an important role, especially in terms of groundwater resources, and it is therefore regarded as important and sensitive. However, wetland systems would normally be regarded as having a Very High level of sensitivity but since the survey confirmed that wetland areas only become evident toward the eastern end of the study area, this drainage system is only regarded as having a high level of sensitivity.

Description of watercourses and wetlands

The study area contains only the drainage area which is the only surface water feature in the study area. A short description of this system will be provided below.

Obligate wetland vegetation was also used to determine the presence of wetland conditions. Obligate wetland species are confined to wetlands and are only able to occur in wetlands. They are therefore reliable indicators of wetland conditions. Field observations over time as well as the following sources were used to determine FW and OW species:

- Marnewecke, G. & Kotze, D. 1999. Appendix W6: Guidelines for delineation of wetland boundary and wetland zones. In: MacKay (Ed.), H. Resource directed measures for protection of water resources: wetland ecosystems. Department of Water Affairs and Forestry, Pretoria.
- DWAF. 2008. Updated manual for the identification and delineation of wetlands and riparian areas, prepared by M.Rountree, A.L. Batchelor, J. MacKenzie and D. Hoare. Stream Flow Reduction Activities, Department of Water Affairs and Forestry, Pretoria, South Africa.
- Van Ginkel, C.E. & Cilliers, C.J. 2020. Aquatic and wetland plants of Southern Africa. Briza Publications, Pretoria.

Table7.2: Description of the individual watercourses and wetlands which forms part of the study area (FW – Facultative wetland species, OW – Obligate wetland species, * - Exotic species).

Watercourse Name	Coordinates of sampling:	Flow regime:
Lower lying drainage system – Main surface water feature in the study area	S 26.010959°, E 26.256496° S 26.012639°, E 26.281909°	Ephemeral
Description of watercourse: The drainage area situated centrally within the study area is the most significant and only surface water feature in the area. It is a large, but poorly defined system which originates about 15 km to the east of the study area and follows a poorly defined flow pattern toward the west where it forms part of the drainage system of the Harts River. Due to the flat topography of this region it rarely contains well defined watercourses while such poorly defined drainage systems dominate. The drainage system therefore transects the study area from east to west though it is highly unlikely that surface water flow will ever occur. It is much more likely that groundwater movement will be a much more prominent element of this system. Furthermore, given the dolomitic geology of the area, a groundwater connection is also likely present between the drainage area and the local aquifer. This drainage area is clearly without a channel but does form a prominent low lying area within the landscape. The width of this drainage		

area is quite extensive and varies from around 150 meters to as much as 500 meters. The drainage area is likely fed by surrounding runoff but is also quite likely the groundwater will also play an important role in its functioning.

As a result, although this drainage area is poorly defined and is largely devoid of wetland conditions, it will still play an important role in terms of the surface water drainage of the area. In addition, it also forms part of the Bo-Molopo Karst Belt Strategic Water Source Area (SWSA) which perform important functions in terms of groundwater resources. The development will however exclude this area from development and should therefore not entail any direct impacts on it. Given that the solar development also implements a comprehensive storm water management system, this will also further limit any anticipated impacts on this drainage system.

This drainage area has also been heavily modified by historical impacts. It was ploughed for crop cultivation several decades ago though the impact is still visible as feint surface furrows and a vegetation layer dominated by pioneer grasses. This would undoubtedly also have influenced the functioning of the hydrology of this system. To the east of the study area this drainage system is also currently still affected by dryland crop cultivation but also by extensive centre-pivot irrigation. This will also have a high impact on the hydrology of this system and will likely contribute to lowering the groundwater level of it. The drainage area is clearly situated in a low-lying shallow valley and in terms of topography clearly supports the formation of a surface water feature. However, the vegetation within it is largely terrestrial and devoid of obligate wetland plants, except for the small depression areas in the eastern portion of the study area. Soil samples also largely indicate the absence of saturated soils, with seasonal saturation only being evident in the eastern portion of it. The drainage system can therefore not be regarded as a defined wetland system and neither does it comfortably fit within the definition of a watercourse. It does however contain patchy wetland areas in the east and clearly functions as a surface water feature and especially regarding groundwater functions and it therefore still important and should be avoided by the development.

Dominant plant species:

Drainage area: *Berkheya onopordifolia, Eragrostis lehmanniana, Cymbopogon pospischillii, Aristida congesta, Lippia scaberrima, Hermannia geniculata, Stoene plumosus, Themeda triandra, Solanum incanum, Senecio coronatus, Asparagus larcinus, Heteropogon contortus, Helichrysum nudifolium, Helichrysum rugulosum, Pogonarthria squarrosa, Cynodon dactylon, Eragrostis curvula, Conyza podocephala.*

Depression areas: *Leptochloa fusca (OW)*.

Protected plant species:

None observed

Soil Sample:

Drainage area – devoid of wetland conditions.

Depression areas – clear wetland conditions.

The drainage area is clearly discernible as a flat, low lying area but which is dominated by terrestrial grasses and without clear riparian and wetland conditions.

From the surroundings the drainage area is clearly a depression in the landscape and therefore substantiates the presence of a surface water feature despite riparian and wetland conditions being largely absent.

Toward the east of the study area, the drainage area does become more prominent and soil saturation also is more pronounced, indicating a much higher moisture regime.

At the eastern portion of the study area, the drainage area also develops small depressions where wetland conditions have become clearly present, and some surface water was also present. This also substantiates that this drainage area forms part of a surface water feature.

Condition and importance of the affected wetland

The low-lying drainage area in the study area forms the main and only surface water feature in the area and a determination of its condition will therefore be undertaken. The drainage area is situated adjacent and to the south of Kiara PV3 of the development and is therefore likely to be affected by it. The wetland assessment will therefore focus on this system. The drainage area is strictly ephemeral and will only contain surface water during years of exceptional rainfall. However, it clearly does function in terms of the surface water of the area and is considered especially important in terms of groundwater recharge and any impact that the development will have on it will therefore be important to determine. Given the lack of a clear channel and also the absence of distinctive riparian condition, there are no suitable indices to apply in order to determine its current condition.

However, toward the eastern end of the study area, some small depressions do become evident, indicating shallow groundwater table and confirming that the drainage area does form a surface water feature. The condition of the drainage area will be determined from this wetland depression portion and inferred from

this for the surrounding section of the drainage area. It will also be possible to apply the WET-Health indices for these wetland depressions and should give an accurate indication of the current condition of the system and its vulnerability to impacts of the development as well as the general condition of the drainage system as a whole. The WET-Health will be taken as representative of the Present Ecological State (PES) of this system.

Table 7.3 refers to the determination and categorisation of the Present Ecological State (PES; health or integrity) of various biophysical attributes of rivers relative to the natural or close to the natural reference condition. The purpose of the EcoClassification process is to gain insights and understanding into the causes and sources of the deviation of the PES of biophysical attributes from the reference condition. This provides the information needed to derive desirable and attainable future ecological objectives for the river (Kleynhans & Louw 2007).

Table 7.4 refers to the Ecological Importance and Sensitivity (EIS) of wetlands. "Ecological importance" of a water resource is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. "Ecological sensitivity" refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. The Ecological Importance and Sensitivity (EIS) provides a guideline for determination of the Ecological Management Class (EMC).

Table 7:3: Ecological categories for Present Ecological Status (PES)

Ecological Category	Description
A	Unmodified, natural
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominately unchanged.
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem function has occurred.
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	Critically/Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

Table 7.4: Ecological importance and sensitivity categories

Ecological Importance and Sensitivity Category (EIS)	Range of Median	Recommended Ecological Management Class
Very High Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications.	>3 and <=4	A
High Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications.	>2 and <=3	B
Moderate	>1 and < = 3	C

Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications		
Low/marginal Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications.	>0 and < = 1	D

In terms of previous wetland spatial resources (Kleynhans 2000, Van Deventer et al 2018) only portions of this drainage system had been identified. According to wetland probability maps (Van Deventer et al 2018) the system is indicated as having a high probability of forming a valley bottom system, while Kleynhans (2000) only recognises the presence of a few small depressions upstream of the site (much the same as those depressions occurring in the eastern portion of the study area). According to these resources the condition of these identified depression areas also range from a Category A/B: Largely Natural to Category C: Moderately Modified and also indicates the uncertainty of these desktop assessments. The current survey has undertaken a more detailed determination of the condition of the system which indicates that a moderate level of modification is more accurate for this system. It is affected by upstream abstraction for centre-pivots which is likely to affect the groundwater level of the system and historical ploughing of the area would also still have some remaining impacts, mostly in terms of the soil profile and vegetation composition. Despite these modifications on the system, it remains important in terms of the surface water functioning but also in terms of the groundwater and groundwater recharge. The development will however avoid this drainage area though there is still a low likelihood that it may have some affect on it in terms of the surface storm water runoff, erosion and sedimentation. However, as long as a comprehensive storm water management system is implemented the impact on this system should remain quite low.

As indicated above, the drainage system and the depression wetland area in particular has been modified by significant impacts. A summary of the impacts will be provided in the following paragraphs. The drainage system has been affected by historical ploughing for dryland crop cultivation.

This drainage system contains deeper soils and it is notable that the moisture regime is much higher here. Consequently, it was ploughed and planted with crops. According to local inhabitants, this was first done during 1966 when flooding of the system occurred. It has since been left uncultivated and vegetation has become re-established. However, feint furrows are still visible, and the vegetation composition is also dominated by pioneer grasses. This ploughing would also have modified the soil profile and it is possible that this also affected the hydrology of the system, i.e. allowed for higher groundwater infiltration which would have affected the moisture regime of the system.

The study area is being used as grazing for domestic livestock and it was notable that trampling was quite high, especially in the small wetland depression areas in the eastern portion of the study area.

To the east of the study area, this drainage system is still being used for crop cultivation and has a large impact on the functioning of the system. These areas have removed the natural vegetation which promotes runoff while decreasing infiltration and in so doing increases surface erosion. This will also have a large influence on the hydrology of the system. Coupled with the crop cultivation will also be fertiliser, pesticide and herbicide runoff. The catchment also contains a network of small dirt roads and tracks and these would also have a significant impact on the wetland. These act as obstructions to flow and will affect the hydrology of the wetland.

It is also notable that several centre-pivot irrigation systems are located to the east of the study area and within this drainage system. This also confirms that this drainage system is associated with a prominent groundwater aquifer which may also contain an elevated groundwater table. This irrigation will abstract water from the drainage system which will then be lost to the system and is likely to result in a drawdown of the groundwater table which may then also have a substantial impact on the hydrology of the drainage system, at least those areas exhibiting wetland depression areas.

From the above described impacts, it should be clear that the depression wetland areas associated with the drainage area (and therefore also the drainage system as a whole) has resulted in a significant level of modification. A WET-Health determination was undertaken for the depression wetland area to determine its current condition and provide an indication of the overall condition of the drainage system. The results of the WET-Health indicated an overall Present Ecological State of Category C: Moderately Modified. This is considered relatively accurate given the impacts on the system.

The EI&S of the wetland depression portion of the drainage system has been rated as being Low: Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. This is a consequence of the small size of the depression wetland areas in relation to the overall drainage system, the lack of riparian and wetland conditions over the majority of the drainage area and currently modified condition of the system.

Risk Assessment

A Risk Assessment for the proposed solar facility which will affect the drainage system in the study area has been undertaken according to the Department of Water & Sanitation's requirements for risk assessment and the provisional Risk Assessment Matrix for Section 21(c) & (i) water use. The drainage system will be excluded from the development though development will still occur in close proximity to it and may therefore still have some affect on it. Given that the majority of this drainage system is devoid of riparian and wetland conditions and the already modified condition of the system it is highly unlikely that the development will have a large impact on it. In addition, provided that a comprehensive storm water management system is implemented the risk should remain low. The risk matrix is only applicable to areas where wetland conditions has formed but should still be implemented for the drainage area as a whole. Despite the drainage area being largely modification and large portion being devoid of riparian and wetland conditions, it should still be regarded as a no-go area and no construction or operational activities including stockpiling, clearing, laydown areas, vehicle movement or any other associated activities should occur within this drainage area. Low Risks: Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Mitigation as recommended as well as any additional mitigation recommended by other specialist studies should be implemented in order to alleviate the risks on the drainage system.

Table 7.5: Risk Assessment

No.	Phases	Activity	Aspect	Impact	Rating	Confidence level	Control measures
1	Mostly Construction Phase but also during operation	Construction of a solar facility	A large drainage system with patchy wetland depression	The construction of the facility will occur in close	L	80	Provided that recommendations are implemented and that the drainage system is excluded from the development and is

			areas may be affected by the proposed development	proximity to the drainage area as well as those patches having been identified as containing wetland conditions and there will be an impact on the catchment of the drainage system which will then have an indirect impact on it.			treated as no-go areas, the anticipated risk should remain low. As the development may still occur in relatively close proximity to it, it will also be important to implement a comprehensive storm water management system.

viii. Terrestrial Fauna Communities

Signs and tracks of mammals are fairly abundant on the site and it is expected that the faunal makeup will be relatively close to the natural condition, both in terms of species composition and population size. Natural vegetation has a high carrying capacity for mammals which has been confirmed to still be the case for this area. However, a few impacts associated with the land use in the area may have some effect on the mammals in the area. Livestock normally has a low magnitude impact in that it decreases the grazing capacity available for the natural mammal population though this impact largely affects larger antelope and will not have a high impact on smaller mammals. Associated within this land use may also be the impact of any herding dogs kept by personnel on the site. Hunting and trapping is also likely to occur in the area. 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. The project would therefore have some impact on the likelihood of such rare and endangered species occurring in the area, though there will remain a significant likelihood of such a species occurring in the area.

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 may also be relevant for the lower lying drainage area in the study area. Although it has been affected by historical ploughing, it will still be able to sustain a higher bio-load which in turn supports a larger mammal population and it is likely that the mammal population along the drainage system will be substantial. This drainage system will however be excluded from
development which should decrease the anticipated impact substantially.

The mammal survey of the site was conducted by means of active searching, camera traps 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 of a small carnivore, which given the white colouration (bone) and hair is most likely that of a Black Backed Jackal (*Canis mesomelas*). Also, a widespread species but which indicate a sufficient prey base for larger carnivores to occur.
- Quills of Porcupines (*Hystrix africaeaustralis*) were noted in several areas. This is also a generalist species, widespread and common in almost all natural areas.
- Several burrows of small mammals were noted which could not be identified but do indicate a significant mammal population in the area.
- Several burrows and excavation of Aardvark (*Oryteropus afer*) occur 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.
- Several observations of Steenbok (*Raphicerus campestris*) and Common Duiker (*Sylvicapra grimmia*) were also made. These species are both widespread but confined to fairly natural or agricultural areas and generally avoid urban areas. Of these, the Steenbok is also listed as a protected species and is therefore of higher conservation value.
- Springhare (*Pedetes capensis*) is also common in the area and also indicate a significant prey base for larger carnivores. This species is widespread but confined to natural areas with deeper sandy soils.
- A colony of Suricate or Meerkat (*Suricata suricatta*) was also noted. This is a widespread species but less common and confined to extensive natural areas.
- Several observations of Aardwolf (*Proteles cristatus*) were also made. 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 a significant diversity, which although dominated by widespread and generalist species, also contain species of higher conservation value. This also indicates that although the mammal population will be somewhat modified, it remains likely that other species of high conservation value will still be present.

Table 7.6: Red Listed mammals likely to occur in the study area (Child et al 2016)

Scientific name	Common name	Status
Damaliscus lunatus lunatus	Southern African) Tsessebe	Vulnerable
Damaliscus pygargus pygargus	Bontebok	Vulnerable
Hippotragus equinus	Roan Antelope	Endangered
Hippotragus niger niger	Sable Antelope	Vulnerable
Pelea capreolus	Vaal Rhebok	Near Threatened
Atelerix frontalis	Southern African Hedgehog	Near Threatened
Felis nigripes	Black-footed Cat	Vulnerable
Leptailurus serval	Serval	Near Threatened
Hyaena brunnea	Brown Hyena	Near Threatened
Otomys auratus	Southern African Vlei Rat (Grassland type)	Near Threatened
Aonyx capensis	African Clawless Otter	Near Threatened

Mystromys albicaudatus	African White-tailed Rat	Vulnerable
Crocidura mariquensis	Swamp Musk Shrew	Near Threatened

It is clear that the area may contain numerous species of conservation importance, as indicated in **Table 7.3**. However, many of these, especially the larger antelope will only be present in conservation or game breeding areas and will not be relevant for the development. These include Tsessebe, Bontebok, Roan Antelope and Sable Antelope. The remaining smaller species are however quite likely to still occur in this area including the Black-footed Cat (*Felis nigripes*), Serval (*Leptailurus serval*), Southern African Vlei Rat (*Otomys auratus*), Hedgehog (*Atelerix frontalis*), Swamp Musk Shrew (*Crocidura ariquensis*), Brown Hyena (*Hyaena brunnea*) and African White-tailed Rat (*Mystromys albicaudatus*).

Figure 7.23 Tracks and signs of mammals on the site include clockwise from top left; a soil mound of the Common molerat (*Cryptomys hottentotus*) quill of a Porcupine (*Hystrix africaeaustralis*), Burrow of an Aardvark (*Orycteropus afer*) and scat of a Black Backed Jackal (*Canis mesomelas*)

Figure 7.25 The following mammals had been recorded by means of camera traps, from top to bottom; Steenbok (*Raphicerus campestris*), Springhare (*Pedetes capensis*), Common Duiker (*Raphicerus campestris*), Suricates (*Suricata suricatta*), Aardwolf (*Proteles cristatus*)

7.4.5. Avifauna

Seventy-four (74) bird species were recorded in and around the study area with 68 species recorded from point counts and 7 species recorded as incidental sightings. A portion of the avifauna species recorded from the study area can be seen in the map illustrating the location of sample points **Figure 7.26.** Two species of conservation concern (SCC) were recorded from the sample sites (not within the project area): Greater Flamingo ((*Phoenicopterus ruber*) and Cape Vulture (*Gyps coprotheres*).

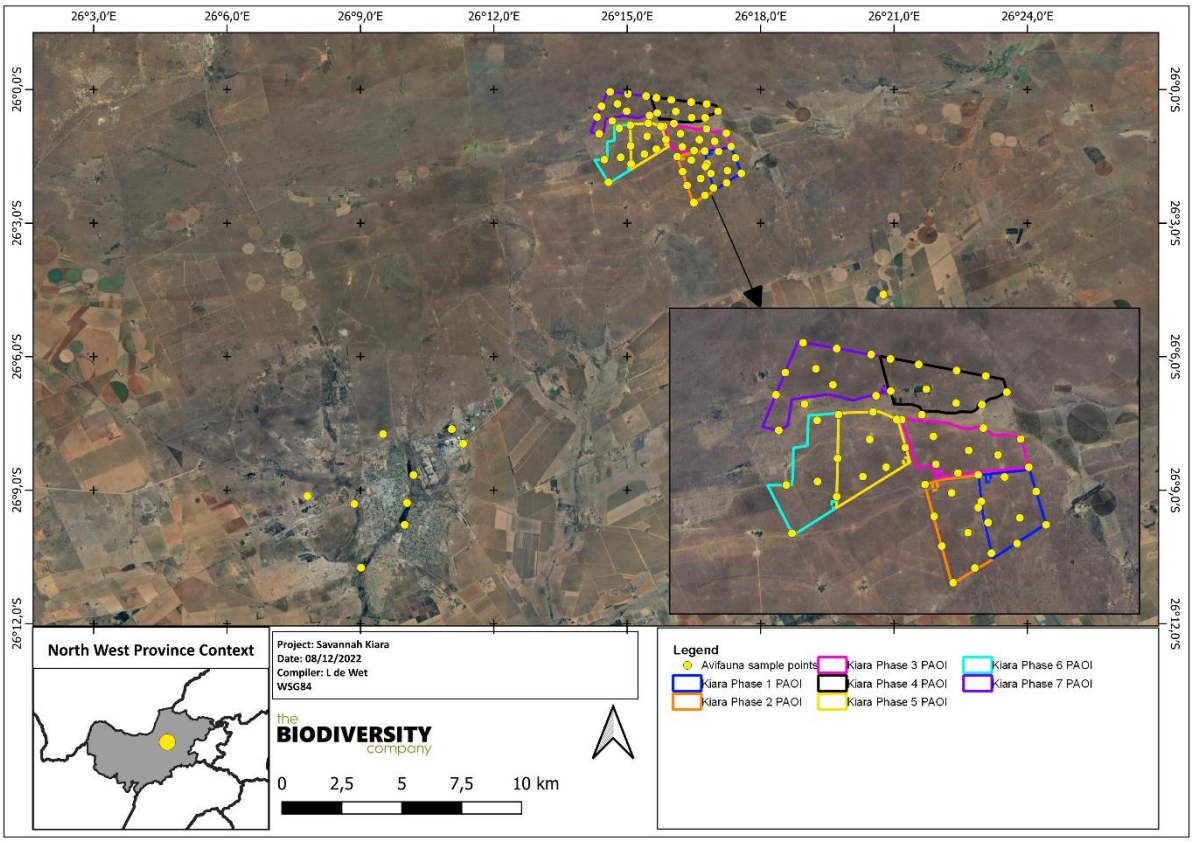


Figure 7.26 Map illustrating the location of sample points

Dominant Species

Table 7.7 below provide a list of the dominant species together with the frequency with which each species appeared in the point count samples. The data shows that the Barn Swallow (*Hirundo rustica*), Red-knobbed Coot (*Fulica cristata*) and Northern Black Korhaan (*Afrotis afraoides*) were the most common species recorded in point counts.

Table 7.7 Dominant avifaunal species within the assessment area as defined as those species whose relative abundances cumulatively account for more than 74% of the overall abundance shown alongside the frequency with which a species was detected among point counts.

Scientific Name	Common Name	Relative abundance	Frequency
Hirundo rustica	Barn Swallow	0,083	33,333
Fulica cristata	Red-knobbed Coot	0,079	33,333
Afrotis afraoides	Northern Black Korhaan	0,053	60,000
Anas erythrorhyncha	Red-billed Teal	0,044	6,667

Scientific Name	Common Name	Relative abundance	Frequency
Phoenicopterus ruber	Greater Flamingo	0,044	6,667
Vanellus armatus	Blacksmith Lapwing	0,044	6,667
Cisticola aridulus	Desert Cisticola	0,035	53,333
Ploceus velatus	Southern Masked Weaver	0,035	26,667
Chrysococcyx caprius	Diederik Cuckoo	0,031	46,667
Cisticola textrix	Cloud Cisticola	0,031	46,667
Mirafra africana	Rufous-naped Lark	0,031	46,667
Cisticola tinniens	Levaillant's Cisticola	0,026	40,000
Prinia flavicans	Black-chested Prinia	0,022	33,333
Streptopelia capicola	Ring-necked Dove	0,022	33,333
Acrocephalus gracilirostris	Lesser Swamp Warbler	0,018	26,667
Cisticola juncidis	Zitting Cisticola	0,018	26,667
Euplectes orix	Southern Red Bishop	0,018	26,667
Gallinula chloropus	Common Moorhen	0,018	26,667
Mirafra fasciolata	Eastern Clapper Lark	0,018	26,667
Acridotheres tristis	Common Myna	0,013	20,000
Bostrychia hagedash	Hadada Ibis	0,013	20,000
Myrmecocichla formicivora	Ant-eating Chat	0,013	20,000
Passer melanurus	Cape Sparrow	0,013	13,333
Scleroptila gutturalis	Orange River Francolin	0,013	13,333
Spilopelia senegalensis	Laughing Dove	0,013	20,000

Tropic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity. The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by insectivores and granivores, followed by omnivores (**Figure 7.27**). The feeding groups is a healthy mix of species and illustrates the largely undisturbed nature of the assessment area.

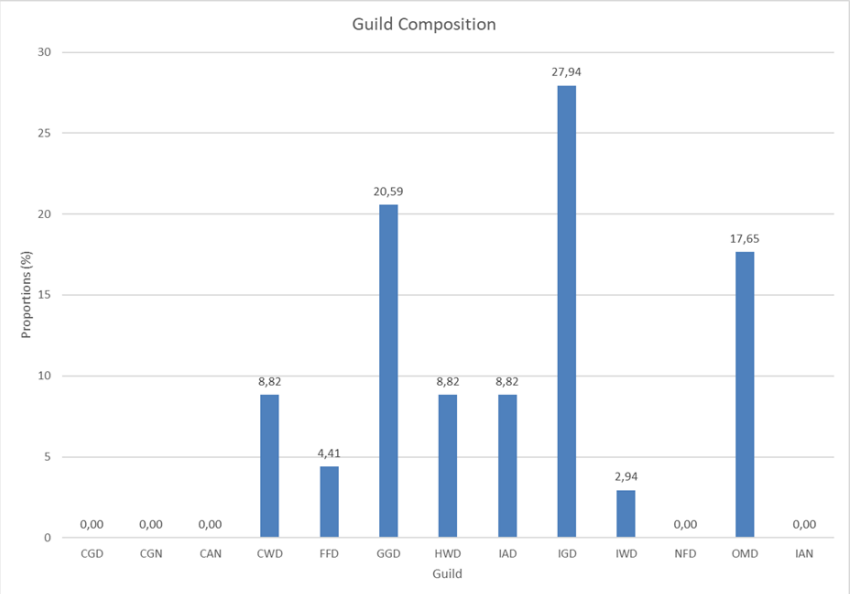


Figure 7.27 Avifaunal trophic guilds for the survey. CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal, CAN, carnivore air nocturnal, CWD, carnivore water diurnal; FFD, frugivore foliage diurnal; GGD, granivore ground diurnal; HWD, herbivore water diurnal; IAD, insectivore air diurnal; IGD, insectivore ground diurnal; IWD, insectivore water diurnal; NFD, nectivore foliage diurnal; OMD, omnivore multiple diurnal; IAN, Insectivore air nocturnal

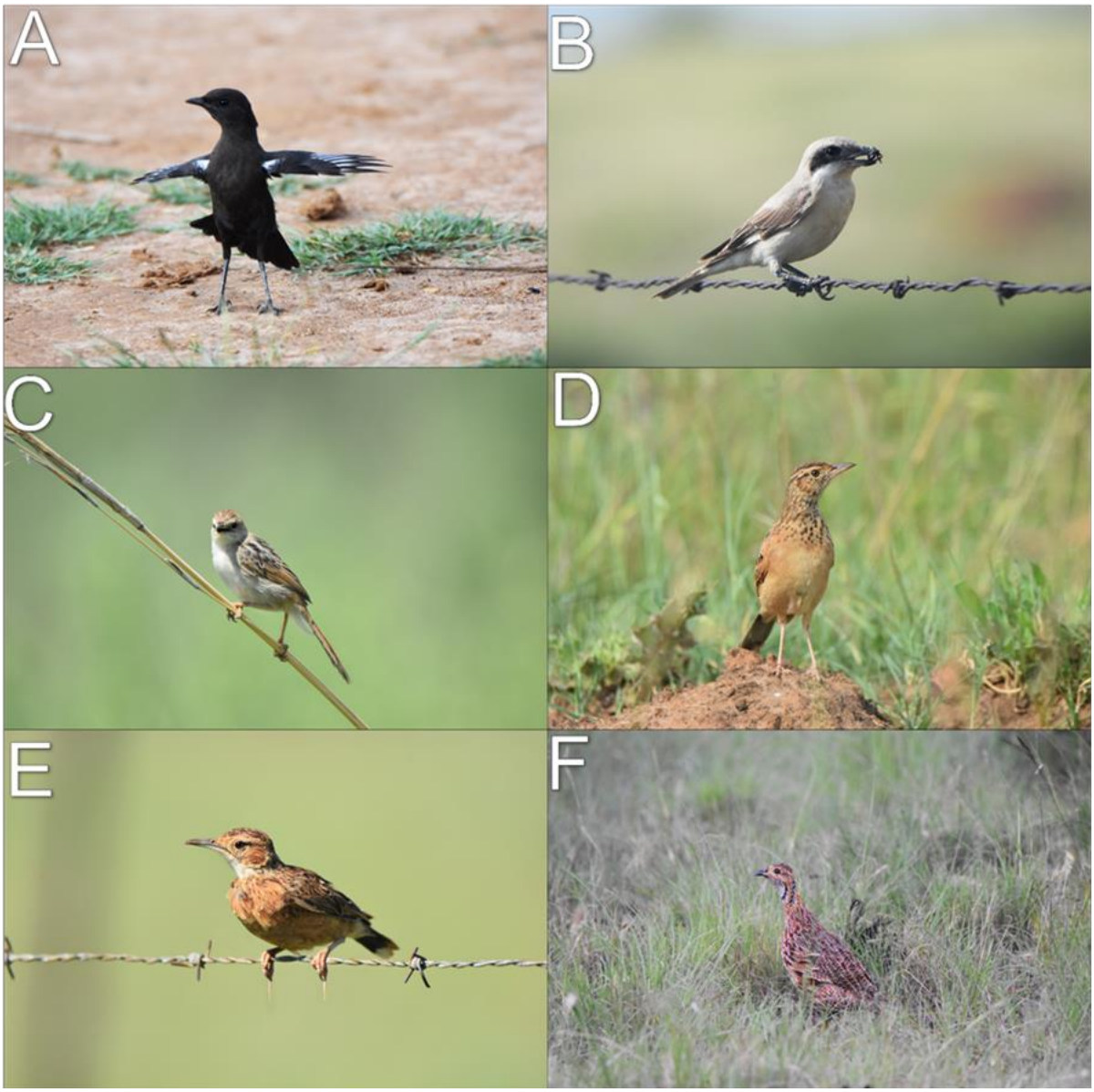


Figure 7.28 Photographs illustrating a portion of the avifauna species recorded in the assessment area: A: Ant-eating Chat (*Myrmecocichla formicivora*), B: Lesser Grey Shrike (*Lanius minor*), C: Levaillant's Cisticola (*Cisticola tinniens*), D: Rufous-naped Lark (*Mirafra Africana*), E: Spike-heeled Lark (*Chersomanes albofasciata*) and F: Orange-river Francolin (*Scleroptila gutturalis*).

Species of Conservation Concern

Two SCC were recorded from the point count surveys (not within the study area) but are likely to fly over the site and thus likely to be affected by impacts associated with the proposed PV facility.

Table 7.8 Avifauna SCC recorded during the site visit

Scientific name	Common name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2021)
Gyps coprotheres	Vulture, Cape	EN	EN
Phoenicopterus ruber	Flamingo, Greater	NT	LC

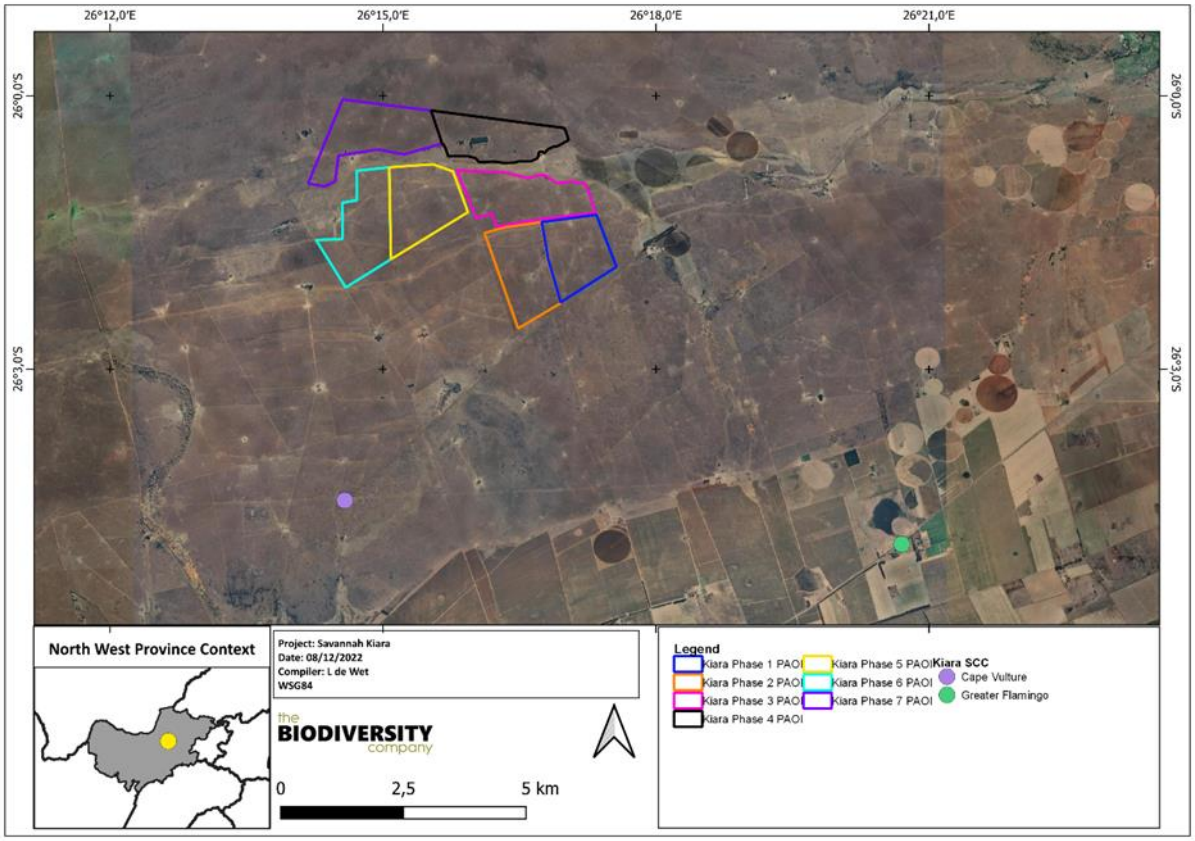


Figure 7.29 Map indicating the location of the SCC recorded from the PAOI and surrounds.

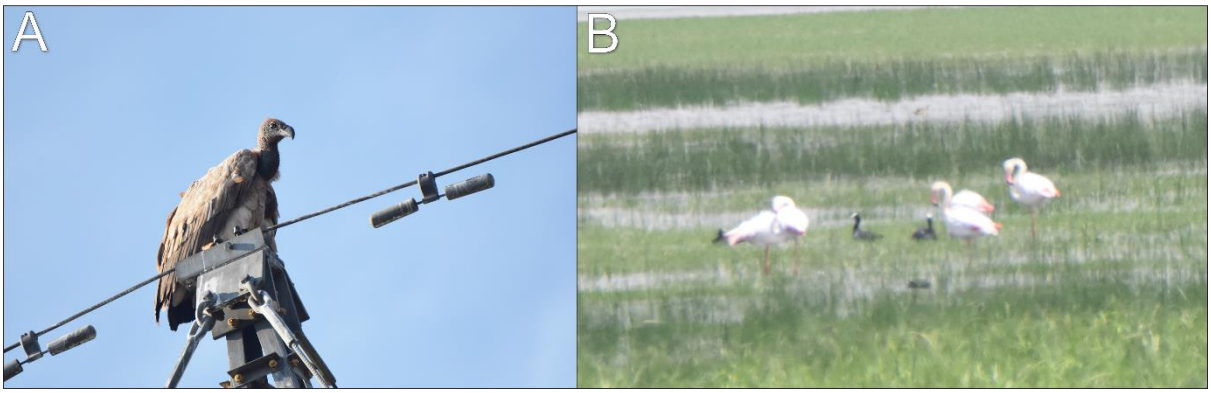


Figure 7.30 Photographs illustrating the SCC recorded for the study area and surrounds. A: Cape Vulture (*Gyps coprotheres*) and B: Greater Flamingo (*Phoenicopterus roseus*).

Gyps coprotheres (Cape Vulture) is listed as Endangered (EN) on both a regional and global scale. Cape Vultures are long-lived carrion-feeders specialising on large carcasses, they fly long distances over open country, although they are usually found near steep terrain, where they breed and roost on cliffs (IUCN, 2017). This species has been recorded from the project area and surrounds.

Phoenicopterus roseus (Greater Flamingo) is listed as NT (Not Threatened) on a regional scale only. This species breeds on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal rains have provided the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft, muddy material for nest building (IUCN, 2017). This species has been recorded within the water resources habitat in proximity to the project site.

Risk Species

Several species were found that would be regarded as high-risk species (**Table 7.9**). Risk species are species that would be sensitive to habitat loss, that are regarded as collision prone species and species that would have a high electrocution risk. These could be species that are not necessarily SCC but would be impacted on by this development. Even though the panels do not pose an extensive collision risk for larger birds, powerlines associated with the infrastructure, guidelines (anchor lines) and connection lines do pose a risk. The fence could also pose a collision risk for various species. A map indicating the location of many of these species can be seen in **Figure 7.31** and photographs of some of these species can be seen in **Figure 7.32**.

Table 7.9 At risk species found in the surveys

Scientific Name	Common name	Collisions	Electrocution	Disturbance/Habitat Loss
Accipiter ovampensis	Ovambo Sparrowhawk	X		
Anas erythrorhyncha	Red-billed Teal	X		
Anas undulata	Yellow-billed Duck	X		
Circus pygargus	Montagu's Harrier	X		
Gyps coprotheres	Cape Vulture	X	X	X
Microcarbo africanus	Reed Cormorant			
Phoenicopterus ruber	Greater Flamingo	X		X
Spatula hottentota	Blue-billed Teal	X		
Tyto alba	Western Barn Owl		X	
Bostrichya hagedash	Hadeda Ibis	X		
Corvus albus	Pied Crow	X		

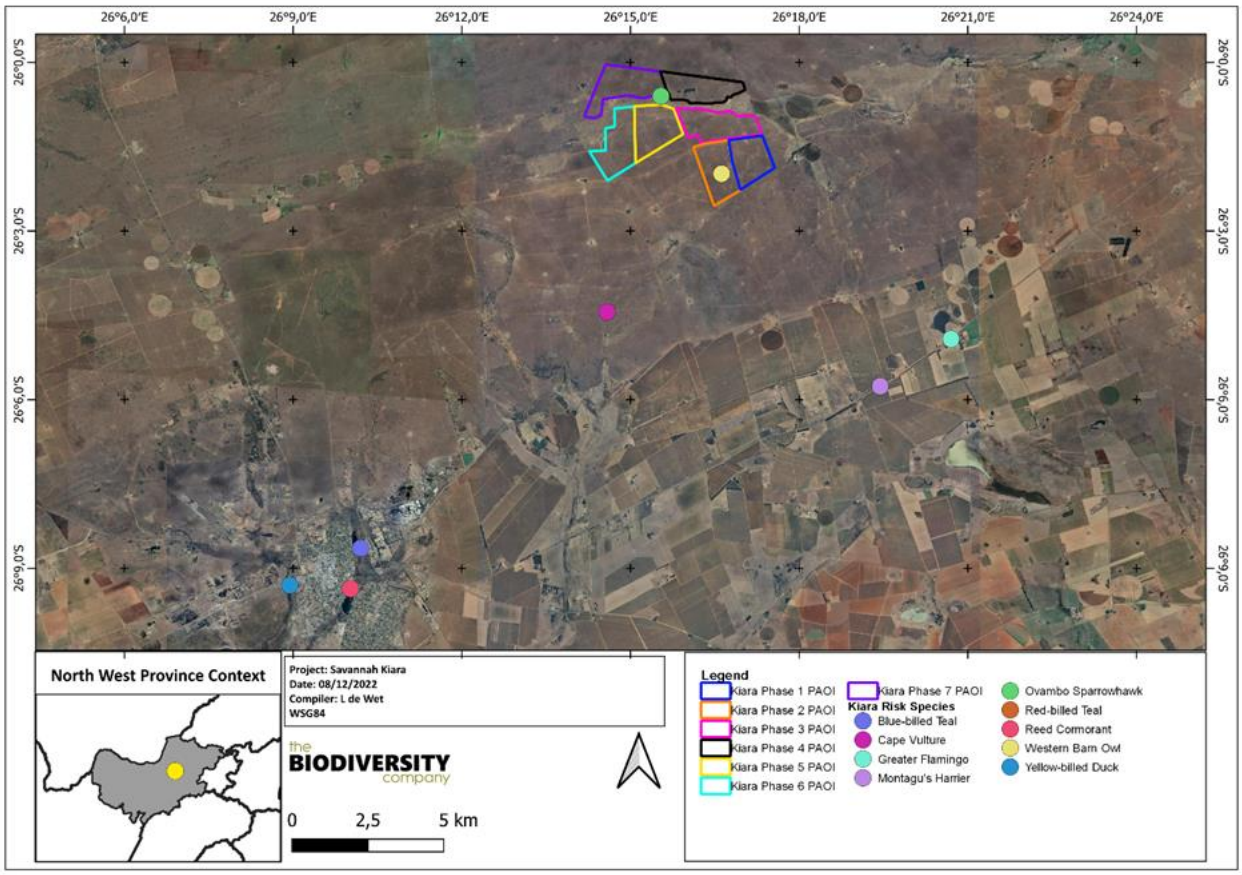


Figure 7. 31 indicating the location a portion of the risk species recorded from the study area and surrounds

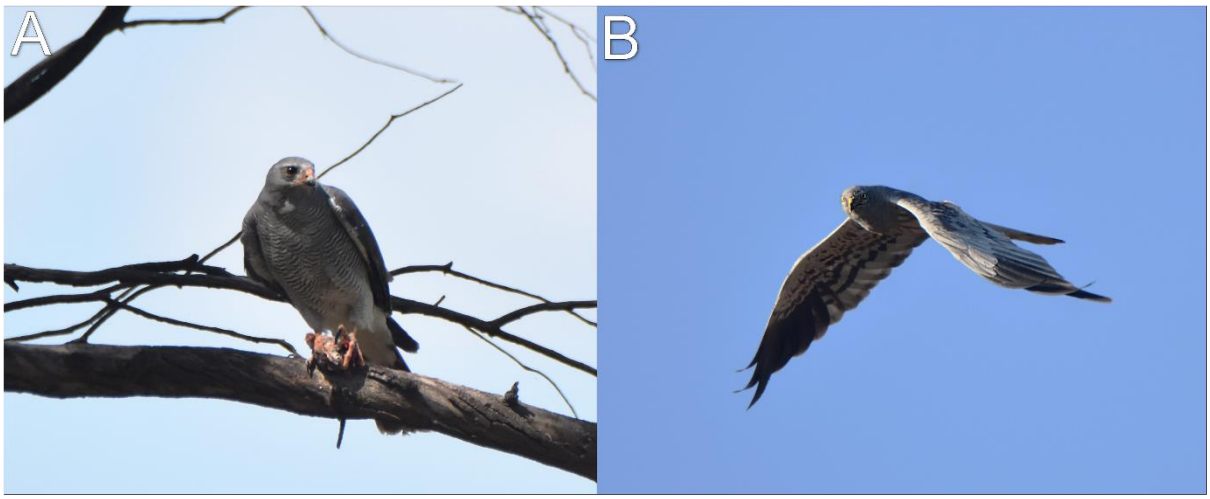


Figure 7.32 Photographs illustrating a portion of the risk species recorded from the study area and surrounds. A: Ovambo Sparrowhawk (*Accipiter ovampensis)* and B: Montagu's Harrier (*Circus pygargus*)

Fine Scale Habitat Use

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities.

The main habitat types identified across the study area were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Four (4) habitats were delineated in total within the site and surrounds, and these are summarised in **Table 7.10** below, along with a brief description and an outline of the key ecosystem services provided by each (**Figure 7.33** and **Figure 7.34).**

Table 7.10 Summary of the habitat types delineated within the Project Area of Influence and their key ecosystem services provided

Habitat	Description	Key Ecosystem Services
Transformed	Little to no functional vegetation remaining. Characterised by development and cleared land.	Foraging for common fauna species.
Degraded Grassland	Grassland vegetation of a low functionality that has been historically impacted by the edge effects of nearby development, heavy grazing, erosion, and human and vehicle ingress.	Foraging for fauna species, erosion control and basic nutrient cycling and grazing land.
Grassland	Functional grassland vegetation that may be considered intact habitat, important for supporting key ecosystem services and providing habitat connectivity between protected areas and CBAs.	Foraging and nesting resources for fauna, including potential SCC. Important erosion control and soil nutrient cycling processes. Habitat connectivity and carbon sequestration.
Bush Clumps	Functional bushclump vegetation forming isolated clumps that provide niche habitats and islands for certain species. Dominated by thorny shrubs.	Foraging and nesting resources for fauna, including potential SCC. Important erosion control and soil nutrient cycling processes and carbon sequestration.

Transformed areas are those areas with no natural vegetation remaining consisting mainly of man-made structures with some areas of heavily invaded (with *Eucalyptus* spp.) grassland. These areas host species that occur in disturbed habitats such as the Cape Sparrow (*Passer melanurus*), House Sparrow (*Passer domesticus*), Speckeld Pigeon (*Columba guinea*), Common Myna (*Acridotheres tristis*), Dark-capped Bulbul (*Pycnonotus tricolor*), Laughing Dove (*Spilopelia senegalensis*), and others.

Grassland habitat comprised grassland with interspersed bushes and trees some of which formed clumps (described as bush clumps). Grassland provides foraging for seed-eating species as well as roosting areas for some species. This grassland habitat hosts species such as Pin-tailed Whydah (*Vidua macroura*), African Stonechat (*Saxicola torquatus*), Common Waxbill (*Estrilda astrild*), Ant-eating Chat (*Myrmecochla formicivore*), Northern Black Korhaan (*Afrotis afraoides*) and Eastern Clapper Lark (*Mirafra fasciolata*) among others.

Bushclumps provide areas of habitat for more secretive birds as well as foraging and nesting sites for small birds. Species recorded in these areas include Tawny-flanked Prinia (*Prinia subflava*), Red-faced Mousebird (*Urocolius indicus*), Black-chested Prinia (*Prinia flavicans*), Bokmakierie (*Telophorus zeylonus*), White-backed Mousebird (*Colius colius*) and Acacia Pied Barbet (*Tricholaema leucomelas*).

Water resources outside of the PAOI host species that may be found flying over the study site including Red-billed Teal (*Anas erythrorhyncha*), Red-knobbed Coot (*Fulica cristata*), Common Moorhen (*Gallinula chloropus*), Great Crested Grebe (*Podiceps cristatus*) and Reed Cormorant (*Microcarbo africanus*).

Figure 7.33 Photographs illustrating examples of the habitat types present within the site. A and B: Transformed areas, C: Degraded grassland, D and E: Grassland with scattered shrubs and F: Bushclumps

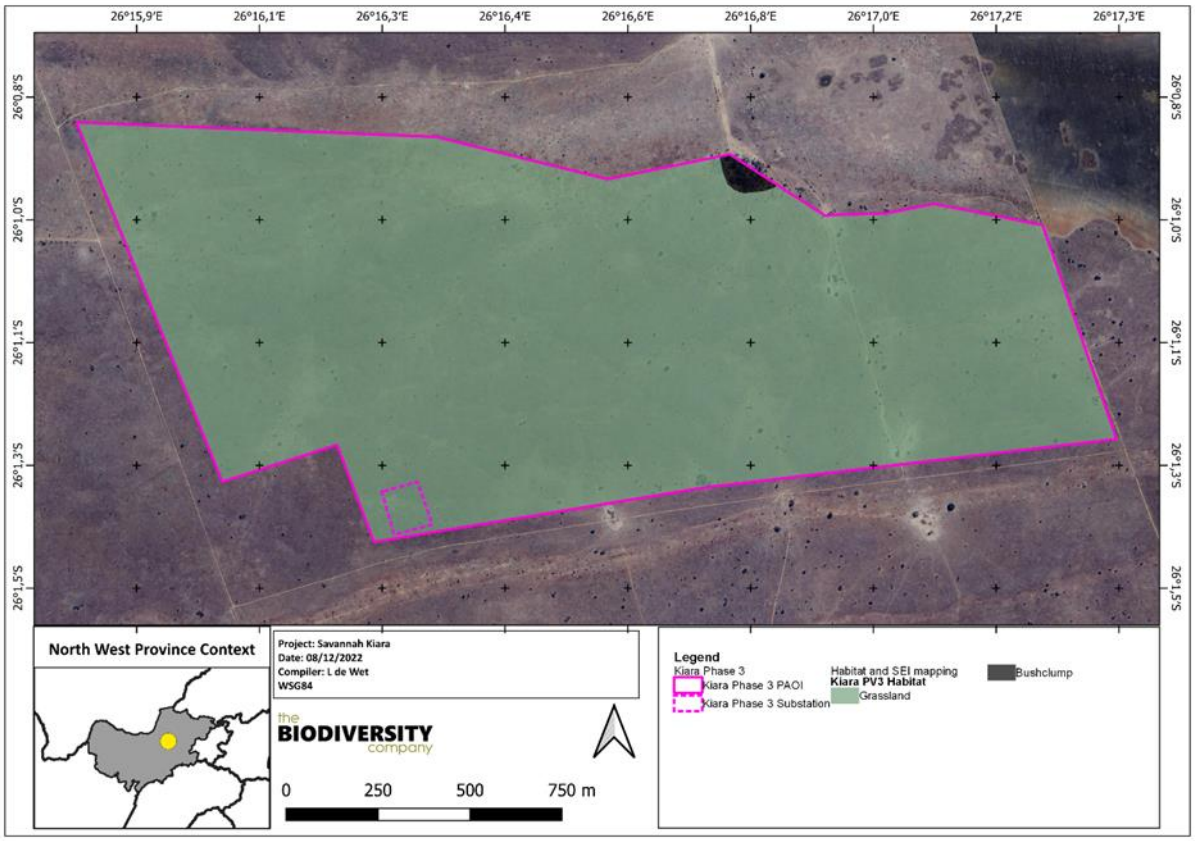


Figure 7.34 Map of the habitats within the Study area

. 7.5. Heritage including Archaeology and Palaeontology

7.5.1. Archaeology

Lichtenburg town was established in 1873 and named "Town of Light". General Del la Rey was buried in Lichtenburg after a fatal shooting incident at Langlaagte. During the 1800's, additional farmers settled in the area. During the Second Boer War, the strategically important town of Lichtenburg was occupied by both Boer and Briton for short spells. In November 1900, a large British force under Col. Robert Baden-Powell was transferred to Lichtenburg and secured the town, and much of the territory with it. In addition, the town is known from Rudyard Kipling's poem, Lichtenberg, which relays the story of a foreign combatant in the second South African War. In 1926, Lichtenburg experienced a gold rush that lasted approximately 10 years. Lichtenburg district is now mostly a farming area, combining cattle and crop-farming and large areas of former diamond mine diggings are now used as grazing.

According to van Schalkwyk et al (1995, SAHRIS NID 6237) in their report completed for the Bakerville Diamond Fields, "land use in the area goes back to the Early Stone Age, as can be determined by the number of stone artifacts found near the old mining commissioner's office. This material seems to be disturbed from its primary context because of the mining activities. It is postulated that similar occurrences will be found in other parts of the diggings, but that this material would have been disturbed out of context. As a result of the dominant land use in the area, many of the heritage resources identified by van Schalkwyk et al (1995) are associated with past and present agriculture, and consist of farming implements, a few windmills, and dipping-troughs. One such trough, located at Elandsputte on the farm Uitgevonden 355JP, was the site where the first diamond was discovered. This structure is a proclaimed national monument (now

Provincial Heritage Site). Van Schalkwyk et al (1995) identified a number of burial grounds within their surveyed area. Heritage resources known from this area include burial grounds and graves, archaeological artefacts and old structures, often associated with farming activities or diamond mining (refer to **Figure 7.35**). In his assessment completed for an adjacent PV facility, Van Schalkwyk (2021) identified no significant archaeological heritage resources but did identify a number of informal burials.

An archaeological field assessment was conducted for the Lichtenburg PV facilities, located approximately 15km west of the proposed development area in 2019. The field assessment conducted noted that, similar to this proposed development area, the area had been disturbed and transformed by agricultural activities. Furthermore, throughout the farming areas several heaps of rocks that were removed from the agricultural fields were identified. During the field assessment conducted in 2019, no archaeological resources, graves or burial grounds were identified in the project area. Another field assessment for the Houthaalbomen PV Facility located 20km from the proposed development area was completed in 2014 by Van der Walt and 2021 by CTS Heritage. Van der Walt (2014) notes that the site lies on a featureless flat plain. The entire development footprint was extensively utilised for crop farming and ploughing through the years resulted in a lateral and downward migration of artefacts making it virtually impossible to identify knapping or manufacture sites and site extent of artefact concentrations. In some areas, borrowing animals brought MSA artefacts to the surface where the sand cover is more than a metre and a half thick and the possibility of finding subsurface material cannot be excluded. Most of the Stone Age archaeology in the study area consists of low densities of scattered (and possibly mixed) MSA and LSA artefacts. The findings of the 2021 field assessment report suggests that the area was occupied or traversed intermittently by Stone Age groups potentially through periods in both the Middle Stone Age (MSA – 300ka: ~40ka) and the Later Stone Age (LSA: 40ka: ~2ka), although artefacts that could be clearly linked with chrono-cultural periods were scarce, which is likely a function of the proximity to primary sources of raw-material. The abundance of high-quality chert rocks in the project area was likely the resource that attracted groups there and resulted in them leaving behavioural traces in the form of stone artefacts.

Indeed, the majority of the stone artefacts identified look to be the result of expedient 'testing' of rocks for quality, and the so-called products in many of the scatters were likely transported away. In this sense, no evidence of substantial densities of finds or occupational debris were identified, and the stone artefacts present are evidenced to have been produced by mobile groups moving through the area. The raw materials exploited for stone artefact manufacture were exclusively local cherts. The presence of primary and secondary sources of chert in association with stone artefacts, are suggestive of the landscape resources that probably drew Stone Age groups to the region over an extended expanse of human evolutionary history. It is likely that a similar archaeological signature will be present within the area proposed for this development and as such, a field survey to assess impacts to archaeological heritage resources is recommended.

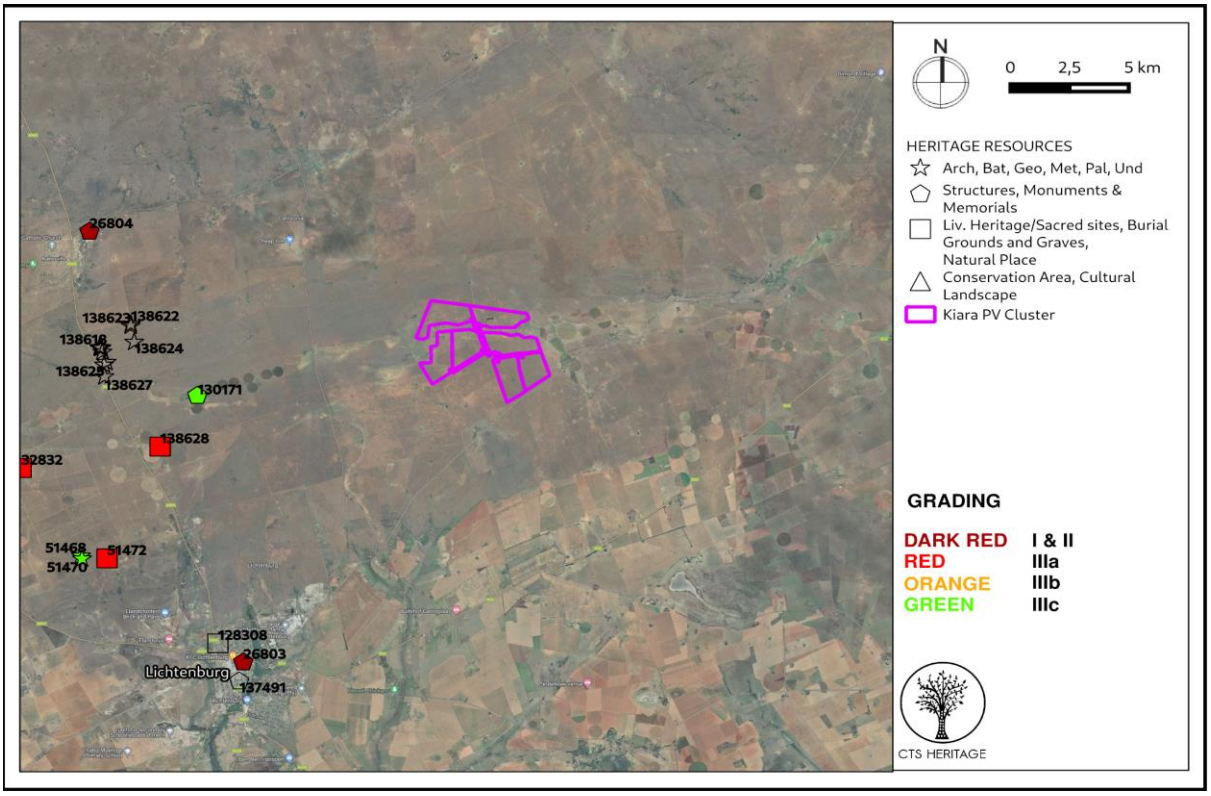


Figure 7.35 Heritage resources previously identified within the study area

7.5.2. Geology, geomorphology and Palaeontology

The proposed development is located on geological deposits belonging to the Monte Christon Formation of the Chuniespoort Group. The Monte Christo Formation is within the Malmani Subgroup. These deposits have a very high sensitivity for impacts to palaeontological resources. This group is known to contain a range of shallow marine to internal stromotolites (domes, columns etc) and organic-walled microfossils. In addition, it is within this group that fossilferous Late Cenzoic cave breccias have been identified, such as within the Cradle of Humankind region. A development located approximately 15km away within the geology was surveyed on foot by Bamford et al. (2019) as part of the Heritage Impact Assessment completed for the Lichtenburg PV facilities in 2019.

According to Bamford (2019), the project area lies on rocks of the Malmani Subgroup, Chuniespoort Group. The Malmani Subgroup is up to 2000m thick and comprises five formations distinguished by the amount of chert stromatolite morphology, intercaled shales and erosion surfaces (Eriksson et al., 2006). The basal Oaktree Formation overlies the Black Reef Formation, and is made up of carbonaceous shales, stromatolitic dolomites and locally developed quartzites. Above this the Monte Christo Formation compromising erosive breccia, overlain by stromatolitic and oolitic platformal dolomites. Next is the Lyttleton Formation of shales quartzites and stromatolitic dolomites. The Eccles Formation comprises a series of erosional breccias and the overlying Frisco Formation is made up mostly of stromatolitic dolomites.

The site proposed for development is in Malmani Subgroup which contains a number of stromatolitic dolomites. These were formed in warm shallow sea and are the accumulation of layer upon layer upon layer of minerals deposited by blue-green algae (also known and cynobacteria) and rarely some flamentous algae. Minerals deposited by the algae include calcium carbonate, calcium sulphate and magnesium carbonate. Very rarely are the algal cells preserved in the stromatolites and these are

microscopic. Stromatolites are essentially trace fossils and these ones are 2750 to 2650 million years old and very abundant. 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 much too old to contain fossils other than blue-green algae. Taking account of the defined criteria, the potential impact to the fossil heritage resources is negligible to extremely low.

Table 7.7 Explanation of symbols for the geological map and approximate ages (Erikssen at al., 2006. Johnson et al. 2006; McCarthy et al., 2006; Rob et al., van der Westhuizen et al., 2006). SG= Supergroup; Fm=Formation

Symbol	Group/Formation	Lithology	Approximate Age
Qc	Quaternary	Alluvium, sand, calcrete	Neogene, ca 2.5 MA to present
C-Pd	Dwyka Group	Diamictites. Tillites, mudstones, shales	Early Permian, Midlle Ecca, ca 280-270Ma
Vmm	Monte Christo FM, Malmani Subgroup, Chuniespoort Group, Transvall SG	Chert-rich dolomite; circles = oolithic	Ca 2585 – 2480 Ma

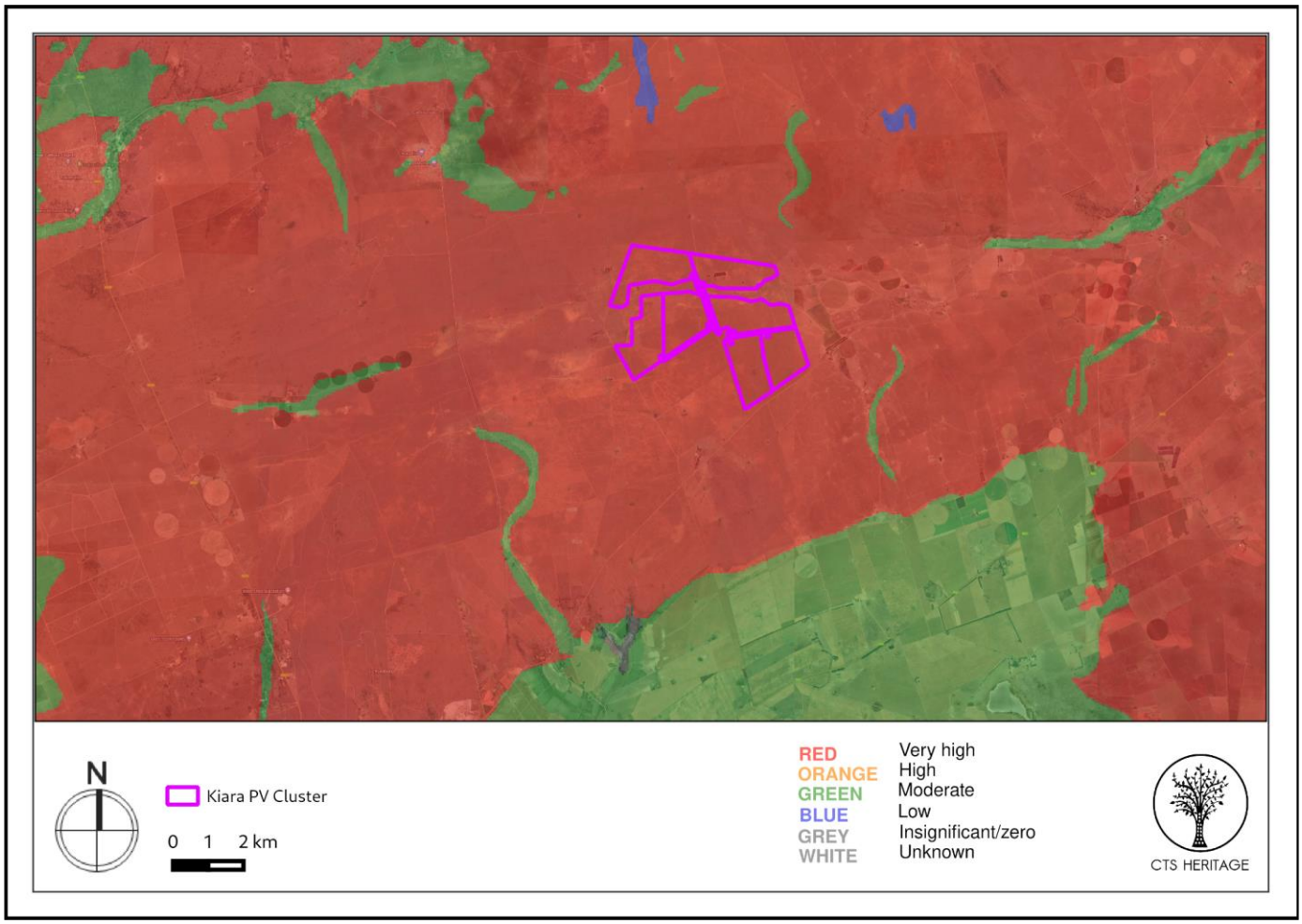


Figure 7.36: Palaeontological sensitivity of the proposed development area

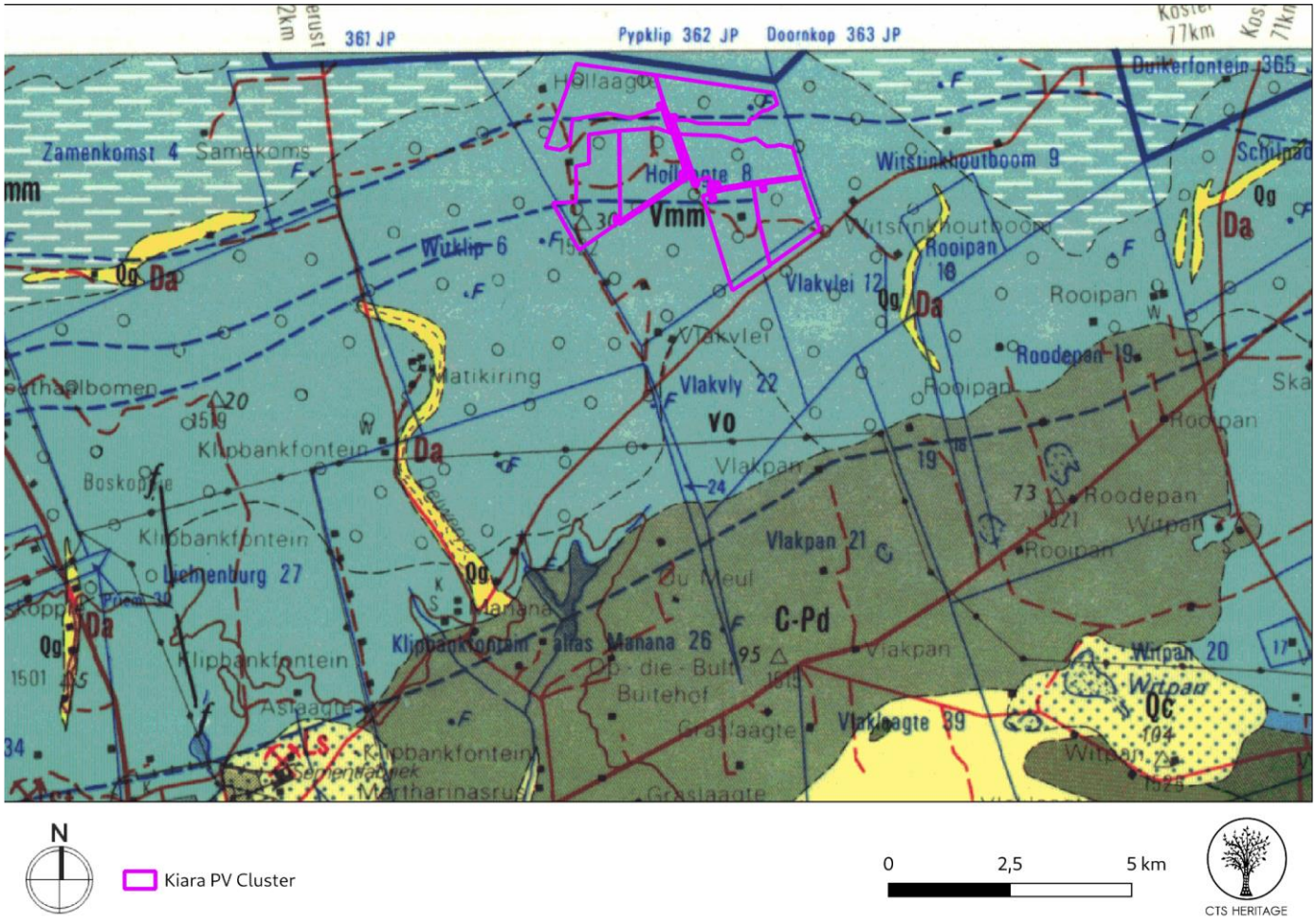


Figure7.37 Geology underlying the proposed project area extracted from the Council of Geoscience Map (1:250 000) 2626 West Rand

7.5.3 Identification of Heritage Resources

Archaeology

Stone Age Archaeology

No significant lithic material was recorded within the development footprint. However, the natural occurring chert and dolomite would have provided suitable raw material for knapping tools. Therefore, it is possible that isolated formal tools can occur in the landscape, but no knapping sites were identified.

Ruins and Kraals

Ruins of old farm structures and kraals are ubiquitous across this broader landscape. The old farmhouse and associated remaining farmscape (023-028), dating to the mid-to-late 19th century, represent the settlement and history of the farm. No midden could be identified, an no surface scatters of the 19th century cultural material were recorded.

Graves

Four sites with marked graces were documented. In addition, unmarked graves may exist within the development footprints. Large heaps of collected stones could be seen throughout the footprint as stones

were removed from agricultural lands to facilitate ploughing. Some of these stones may be unknowingly removed from graves.

Palaeontology

Rocks with very high palaeontological sensitivity are present within the development footprint and palaeontological mitigation measures must be incorporated into the Environmental Management Programme (EMPr) for this project. Due to the fact that the 1:250 000 scale vector maps obtained from the Council of Geoscience indicate the rock unit underlying the area applicable to this report being the Chuniespoort Group of the Transvaal Supergroup, lead to an initial assessment that very distinctive fossils will be present. Fieldwork during this survey as well as literature surveys indicated that the rock units that will be exposed most of the time is the potentially fossililferous Malmani Subgroup, a well-known rock sequence of the Transvaal Supergroup that contains highly significant palaeontological heritage (MacRae 1999; McCarthy and Rubidge 2005; Johnson et al., 2006).

The dolomite of this specific study area is the basal chert-rich part of the Monte Christo Formation. The Malmani Subgroup is known for the well-defined stromatolite structures associated with the dolomite (Obbes, 1995; Johnson et al, 2006).

The Monte Christo Formation is known for the presence if well-defined karst topography with evidence of sinkhole formation as well as cave breccia present in the surface deposits associated with local depressions in the landscape.

Heritage Resource Identified

Table 7.11: Significant heritage resource identified within the development area

Site No.	Description	Type	Co-ordinates	Grading	Mitigation
001	Stone kraal No archaeological context	Kraal	-26.007382; 26.271502	IIIC	20m no-go Buffer. Falls within sensitive area
002	Stone kraal No archaeological context	Kraal	-26.007479; 26.271509	IIIC	20m no-go Buffer. Falls within sensitive area
003	2 Stone Kraals. Some metal fragments	Kraal	-26.007706; 26.272005	IIIC	20m no-go Buffer. Falls within sensitive area
004	Large Stonewalled Kraal. No archaeological contex	Kraal	-26.008479; 26.272781	NCW	NA
005	2 Graves. Fieldstone cairns and rectangular fieldstone frames, one remaining slate headstone	Graves	-26.006966666; 26.27405833	IIA	20m no-go Buffer. Falls within sensitive area

006	Small Stone Structure. No archaeological context	Kraal	-26.006152777; 26.27443888	NCW	20m no-go Buffer
007	Small Stone Structure. No archaeological context	Kraal	-26.0054361111; 26.27435277	NCW	NA
008	Stone Walls. No archaeological context	Kraal	-26.008127777; 26.27611111111	IIIC	20m no-go Buffer. Falls within sensitive area
009	Two-Room stone structure. No archaeological	Ruin	-26.007719444; 26.27643333	IIIC	20m no-go Buffer. Falls within sensitive area
010	Possible Grave. Fieldstone calm	Graves	26.00795; 26.27675833	IIIA	50m no-go Buffer. Falls within sensitive area.
011	Stone Kraal. No archaeological context.	Kraal	-26.00485; 26.271925	NCW	NA

Table 712.: Significant fossil heritage identified within the development area

Site No.	Description	Type	Co-ordinates	Grading	Mitigation
009	Stromatolitic dolomite of the Monte Christo Formation. Weathered stromatolite structures in dolomite. These structures are common in the Malmani Subgroup and although construction of the solar development will destroy some of the structures, it will not have a significantly negative impact. Micro stromatolitic structures and breccia in dolomite and chert beds of the Monte Christo Formation.	Fossil	26.011931°S 26.277686°E	IIIC	Chance Fossil find procedure

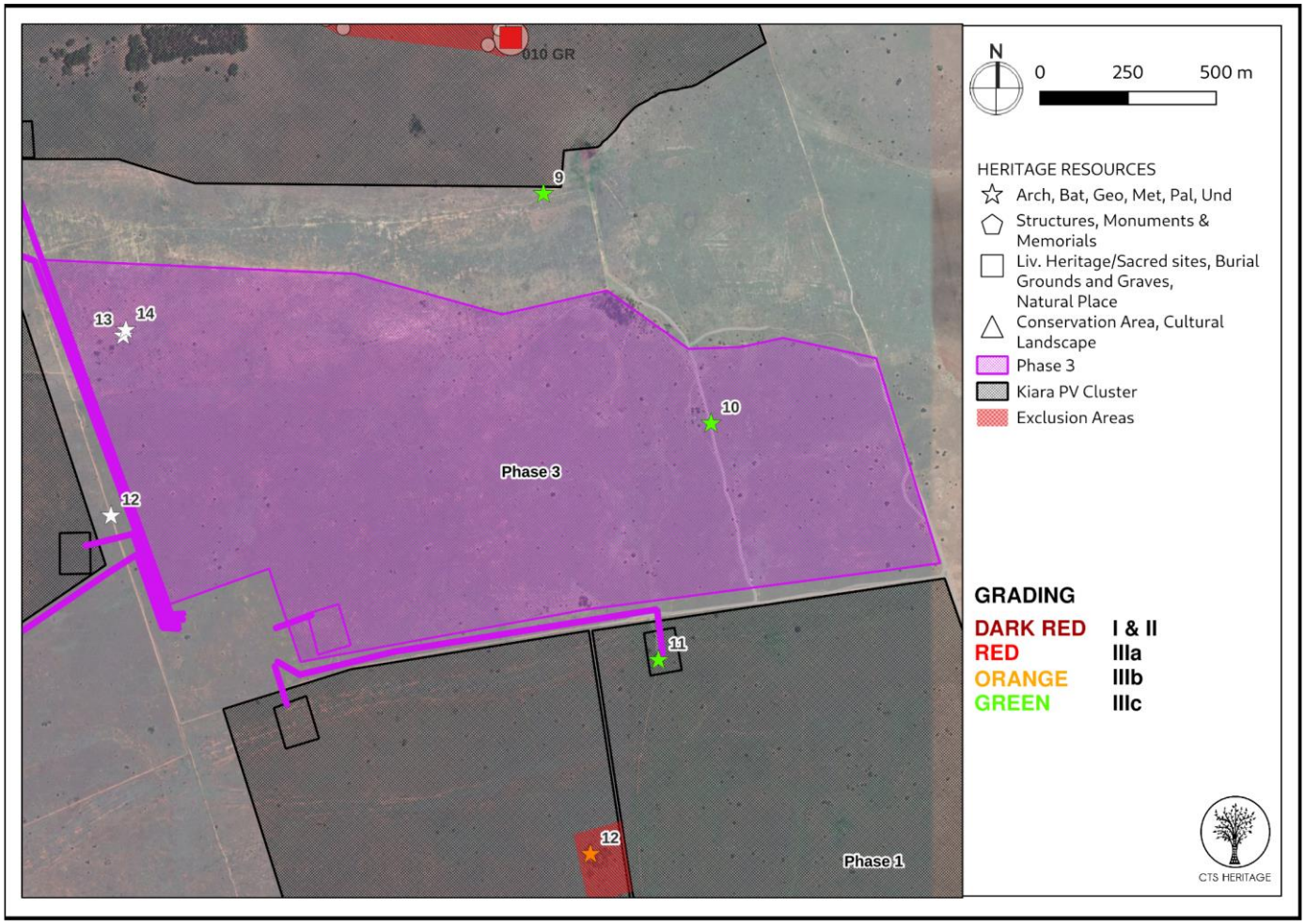


Figure 7.38 Heritage Resources identified in the field assessments in the vicinity of the proposed development area

7.6 Visual Quality

Originally a town that endured a ten-year diamond rush from the late 1920's Lichtenburg's main economic activity today is the production of maize (including groundnuts and sunflower seeds), as well as meat. Predominately a farming town that owes its existence to the presence of natural water resources in the areas. Lichtenburg lies in the heart of the maize triangle, which is the main maize growing area in South Africa. Another major economic activity is the production of cement and within an 80-kilometre radius of Lichtenburg three major cement producers can be found.

The study area is sparsely populated outside of the Lichtenburg urban areas (i.e. 26.13 people per km^2 within the Ditsobatla Municipality). Lichtenburg (lying approximately16km away from the proposed project) is the largest town that is close by in the study area, with a population density of 241.86 people per km^2. In addition to Lichtenburg, a number of isolated homesteads occur throughout the study area.

Figure 7.39 Topography and vegetation of the region.

Access to the proposed development area (from Lichtenburg) is provided by the Manana secondary road that joins the R52 arterial road near Lichtenburg.

The Watershed MTS substation is located at a distance of 15.8km south-west of the proposed site. A great number of power lines, associated with this substation, are located south and west of the site. The power lines traversing the site to the south include:

» Pluto / Watershed 1275kV
» Hera/Watershed 1275kV

The powerlines traversing the site to the west include:

» Watershed – Mmabatho 1 and 2 88kV
» Slurry PPC – Watershed 1 88kV
» Watershed – Zeerust 1 13kV

Figure 7.40 Power line infrastructure along the R505 arterial / main road

Land use activities within the broader region are predominantly described as undeveloped (vacant open space or farmland), with mining/quarrying activity evident towards the north-west (diamond mining) and informal digging south-west of the proposed site.

The Rall Broers Private Nature Reserve is located north-west of the site at a distance of approximately 18.4 km at the closest.

Despite the infrastructure in and around the town of Lichtenburg and the industrial type of infrastructure at the Watershed MTS with its associated power lines, the greater landscape of the study area is characterised by wide-open spaces, with otherwise very limited development. It should however be noted that there are other approved renewable energy projects within the study area (namely, Lichtenburg 1, 2 and 3 Solar PV Projects towards the southwest of the Kiara Solar PV Cluster, as well as an unknown / 'incorrectly specified project' falling within the homestead areas of Vlakpan 1, 2, 3 and 4 which lie southeast of the Project site), that may change the landscape to some degree in the future.

Figure 7.41 Landscape character of the study area showing undeveloped wide-open spaces interspersed with power lines (from the R52)

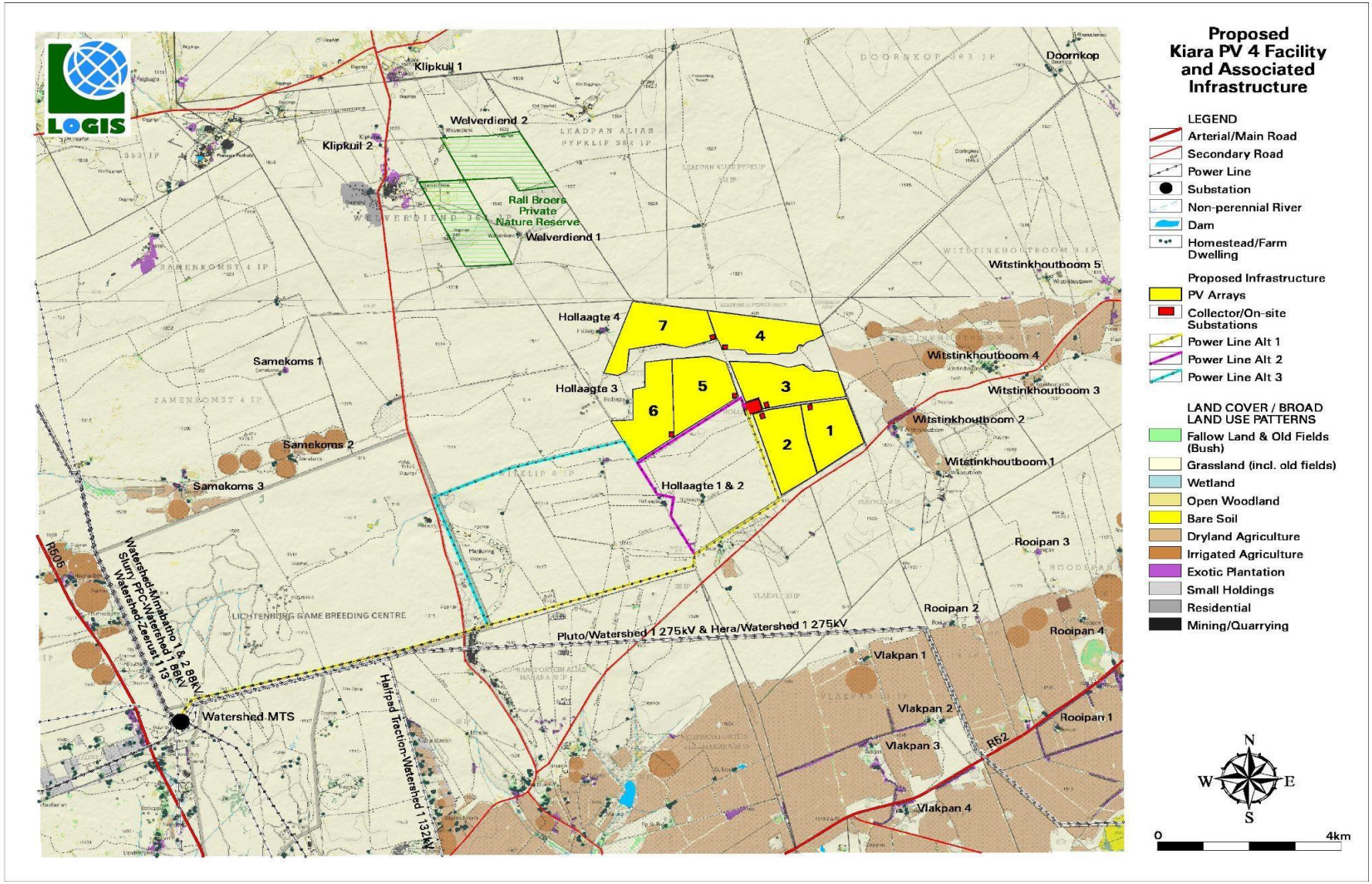


Figure 7:42 Land cover and broad land use patterns of the proposed Kiara PV3 Facility

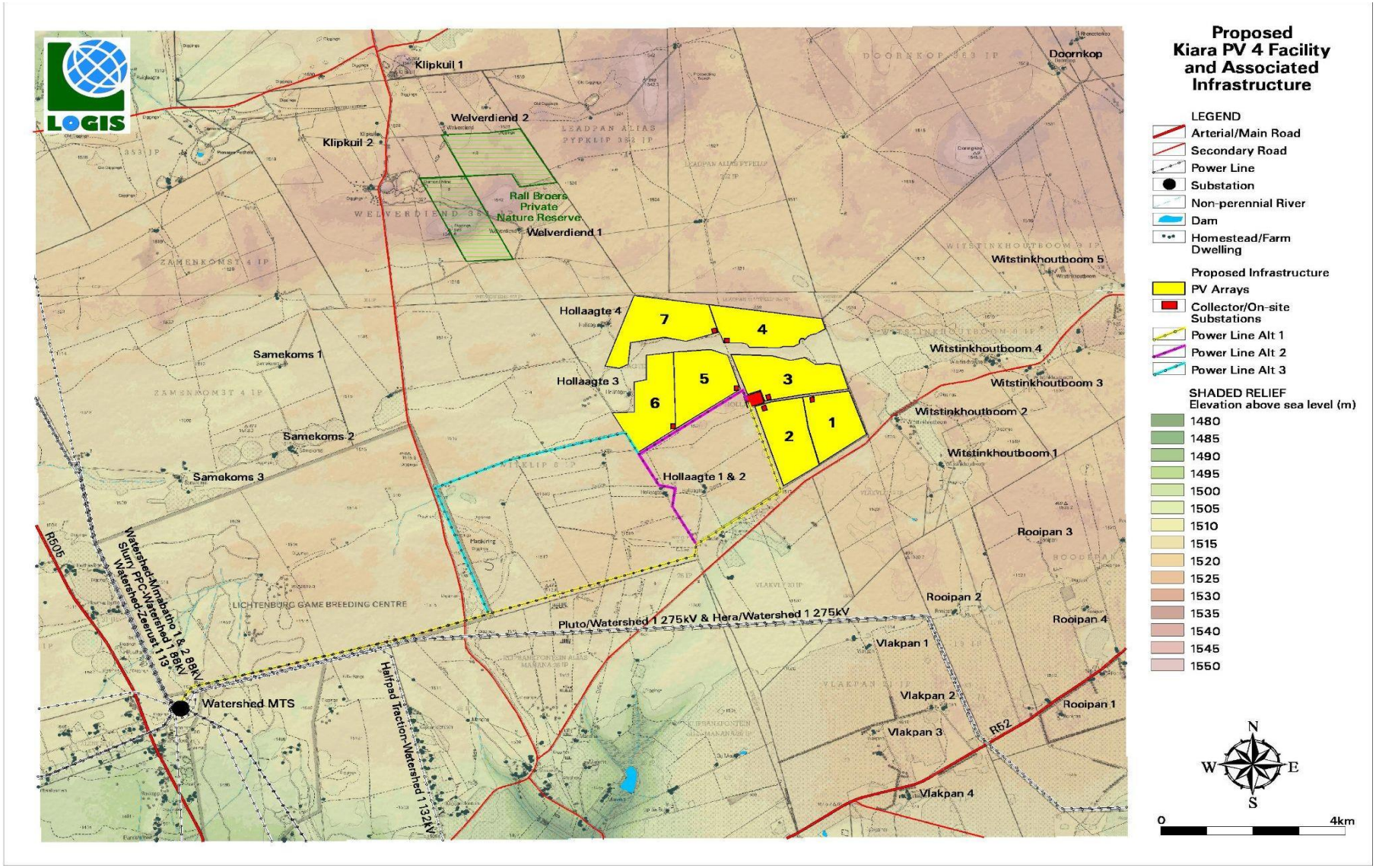


Figure 7.42: Shaded relief map of the study area

7.7 Social Context

The closest major town to the project site is Lichtenburg, which is located approximately 10km south-east of the project site. Other towns in proximity of the project site include Bakerville, located approximately 14 km north, and Itsoseng located approximately 24km west of the project site. Mahikeng, the provincial capital, is located approximately 53km north-west of the project site.

Lichtenburg serves as the administrative centre of the Ditsobotla LM. Lichtenburg is located at the centre of the maize triangle, considered to be the primary maize growing area in South Africa, and Lichtenburg's main economic activity is the production of maize (corn). The production of cement is also considered to be a major economic activity with three large cement producers located within 80km of the town. Several factories manufacturing liquid fertilizer, animal feed and agricultural equipment have also been established.

The Lichtenburg area is considered to have a unique historical background and houses a number of places of interest including the Lichtenburg Diggings Museum, Bakerville, the Burning Vlei, Wondergat, and monuments such as the General De la Rey Square.

The surrounding area within which project is proposed is characterised by a number of small holdings which are used for small-scale agriculture (i.e., maize and livestock), residential, and semi-industrial (earth moving and agricultural equipment). Existing built infrastructure is present within and surrounding the study area, some of which are expected to be occupied. It is assumed that these buildings include farm homesteads, workers quarters and warehouses. The vertical and horizontal landscapes are also disturbed due to the presence of linear infrastructure within the surrounding area.

Table 7.13 provides a baseline summary of the socio-economic profile of the Ditsobotla Local Municipality within which Kiara PV3 is proposed. The data presented in this section have been derived from the 2011 Census, the North West Provincial Spatial Development Framework (PSDF), and the Ngaka Modiri Molema District Municipality and Ditsobotla Local Municipality IDPs.

Table 7.13: Baseline description of the socio-economic characteristics of the area proposed for Kiara PV3 Facility.

Location characteristics
» The project is proposed within the North West Province, the province located to the west of the major population centre of Gauteng Province. » The project is proposed within the Ditsobotla LM of the Ngaka Modiri Molema DM. » The Ditsobotla LM is approximately 6 398.7km² in extent.
Population characteristics
» Ditsobotla LM has a population of 181 866 which is about one-fifth of the figure in Ngaka Modiri Molema 889,108. » The LM occupies an area of land approximately 6 465km² in extent and has a population density of 26/7km². » Between 2001 and 2011 the LM experience a positive population growth of 1.3% per year. This is higher than the DM population growth of 1.0% between 2001 and 2011. » According to Census 2011, the significant majority of 89.1% of the Ditsobotla LM population are Black African, followed secondly by 8.2% which are White, 1.9% which are Coloured, and 0.6% which are Indian / Asian. This population structure corresponds to that of the Ngaka Modiri Molema DM, and North West Province. » The Ditsobotla LM is slightly male dominated with males making up just over half (50.5%) of the municipal population, and females the remaining 49.5% of the population. This correlates with the Provincial population

which is also slightly female dominated (comprising 50.7% males, and 49.3% females), but differs from the District and National populations which are both females dominated.

- When assessing five-year age groups, the largest proportion of the population are between the ages of 0 to 4 years old, with the proportion decreasing uniformly as age increases. There are no significant outliers within any one age group. The age structure of the North West Province and South African national populations are similar to one another, but differ somewhat from that of the Ditsobotla LM and Ngaka Modiri Molema DM.
- The dependent portion of the population typically comprises youth below 15 years of age which are yet to enter the workforce, and individuals 65 years and older which would typically already have retired from the workforce.
- The Ditsobotla LM has a dependency ratio of 38.1; implying that for every 100 people within the Ditsobotla LM, over two thirds (i.e. 38.1) of them are considered dependent. This figure is slightly lower than the Ngaka Modiri Molema DM (39.2), but higher than the provincial (35.3) and national (34.5) dependency ratios

Economic, education and household characteristics

- Approximately 14.7% of the Ditsobotla LM population aged 20 years and older have received no formal form of schooling.
- The majority of 29.9% of the LM population have received some secondary education (which correlates with the DM, Provincial, and national averages), followed closely by 22.6% which have received some primary schooling. Approximately one fifth (20%) of the LM population have completed Grade 12 / Matric, with 6.8% having received some form of higher / tertiary education.
- Due to the fact that the majority of almost three quarters (73.2%) of the Ditsobotla LM population have not completed Grade 12 / Matric, it can be expected that a large proportion of the population will either be unskilled or have a low-skill level, and would therefore either require employment in non-skilled or low-skilled sectors; or alternatively would require skills development opportunities in order to improve the skills, and income levels of the area
- The Ditsobotla LM has an unemployment rate of 28.3%.
- Of the Ditsobotla LM's labour force (i.e. individuals ages between 15 and 64 years of age) the majority of 43.2% are not economically active.
- The economically inactive proportion of the Ditsobotla LM's labour force is slightly lower than the DM (47.9%), but higher than the Provincial (40.2%), and national (39.2%) averages.
- Approximately 14.3% of the Ditsobotla LM's labour force is unemployed.
- The unemployment rate for the LM is fractionally lower than the DM (14.8%), as well as the Provincial (17.1%), and national averages (16.5%).
- Over two thirds (68.4%) of households within the Ditsobotla LM fall within the low income (poverty level) bracket (i.e. below R38 400 per annum).
- Approximately one quarter (25.9%) of households within the LM fall within the medium income bracket, while the remaining 5.7% fall within the high income bracket.
- According to the Ditsobotla LM IDP 2017 – 2018 the LM contributes 22.7% to the DM economy.
- The finance and business services sector represent the largest contributing sector with a contribution of 24.7%, followed by the trade sector with a contribution of 19.1%, the manufacturing sector which contributes 11.8%, and the general government service which contributes 11.4%.
- The dominant economic sectors within the LM include finance and business services (25%); wholesale and retail trade, catering and accommodation (19%); manufacturing (12.2%); and general government services (11.5%).

Services

- Approximately two thirds (66%) of households within the Ditsobotla LM have access to piped water inside their yard / dwelling which is equivalent to the basic level of service provision.
- Approximately 23.2% of households receive piped water outside of their yard, while 10.9% have no access to water services
- The majority of 34.8% of the Ditsobotla LM households make use of the bucket system, followed by 33.7% which have access to and make use of flush or chemical toilets
- A quarter (25%) of households within the LM have access to pit latrines, and 6.5% of households have no access to sanitation services
- Approximately 32 933 (74%) of households within the LM are connected to the electricity grid. The LM has a total backlog of 11 567 (26%) of households without access to electricity.

CHAPTER 8: ASSESSMENT OF IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct and indirect) expected to be associated with the development of the Kiara PV3 Facility, including a Battery Energy Storage System (BESS). This assessment has considered the construction of a solar PV facility with a contracted capacity of up to 120MW, within a development area of 195ha. The PV development area includes the following infrastructure:

- PV modules and mounting structures
- Inverters and transformers
- Cabling between the panels.
- Cabling from the onsite substation to the collector substation (either underground or overhead).
- 132kV onsite facility substation.
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Temporary and permanent laydown area
- Grid connection solution will include:
    - Facility Substation
    - Eskom Switching Station
    - A 275kV powerline (16.6km in length) (either single or double circuit), to connect the PV facility to the Watershed MTS

The development area considered for the proposed Kiara PV3 Facility is within Portion 2 of the Farm Hollaagte No. 8 and the Remaining Extent of the Farm Hollaagte No.8 that comprises an area of approximately 856.5ha ha in extent, which was considered through the Scoping Phase of the EIA process by the independent specialists and the EAP. On-site sensitivities were identified through the review of existing information, desktop evaluations and detailed field surveys.

The specialist assessments undertaken as part of this EIA process have considered the development footprint (refer to **Figure 8.1**) which was provided by the developer.

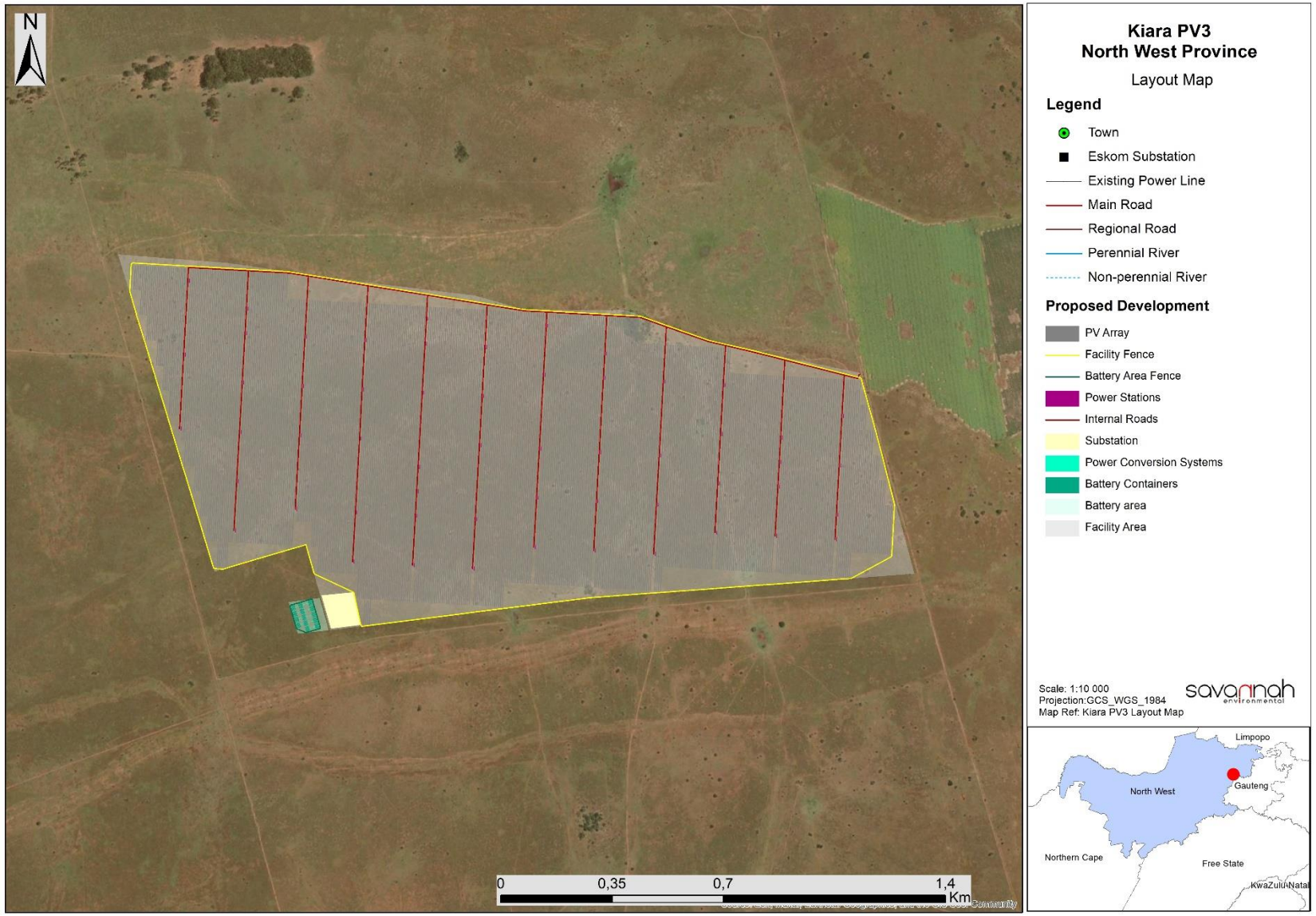


Figure 8.1 Site development layout of the Kiara PV3 Facility

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

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

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

Requirement	Relevant Section
3(1)(h)(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed, (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated.	The impacts and risks identified to be associated with the development of Kiara PV3 Facility, including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in **Sections 8.2.2, 8.3.2, 8.4.2, and 8.5.2.**
3(1)(h)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	The positive and negative impacts associated with the development of the Kiara PV3 Facility are included in **Sections 8.2.2, 8.3.2, 8.4.2, and 8.5.2.**
3(1)(h)(viii) the possible mitigation measures that could be applied and the level of residual risk.	The mitigation measures that can be applied to the impacts associated with the Kiara Solar PV3 Facility are included in **Sections 8.2.2, 8.3.2, 8.4.2, and 8.5.2.**
3(1)(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	A description of all environmental impacts identified for the Kiara PV3 Facility and associated grid connection during the EIA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in **sections 8.2.2, 8.3.2, 8.4.2, and 8.5.2.**
3(1)(j) an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts, (ii) the nature, significance and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.	An assessment of each impact associated with the development of the Kiara PV3 Facility and associated grid connection, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in **sections 8.2.2, 8.3.2, 8.4.2, and 8.5.2.**

Requirement	Relevant Section
3(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as well as for inclusion as conditions of authorisation.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in **sections 8.2.2, 8.3.2, 8.4.2, and 8.5.2.**

8.2 Potential Impacts on Terrestrial Ecology (including flora and fauna)

The development of the Kiara PV3 Facility is likely to result in a variety of impacts associated with:

- Loss of vegetation and consequently habitat and species diversity as a result.
- Impacts on watercourses, wetlands or the general catchment.
- Loss of protected, rare or threatened plant species.
- 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.

Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details).

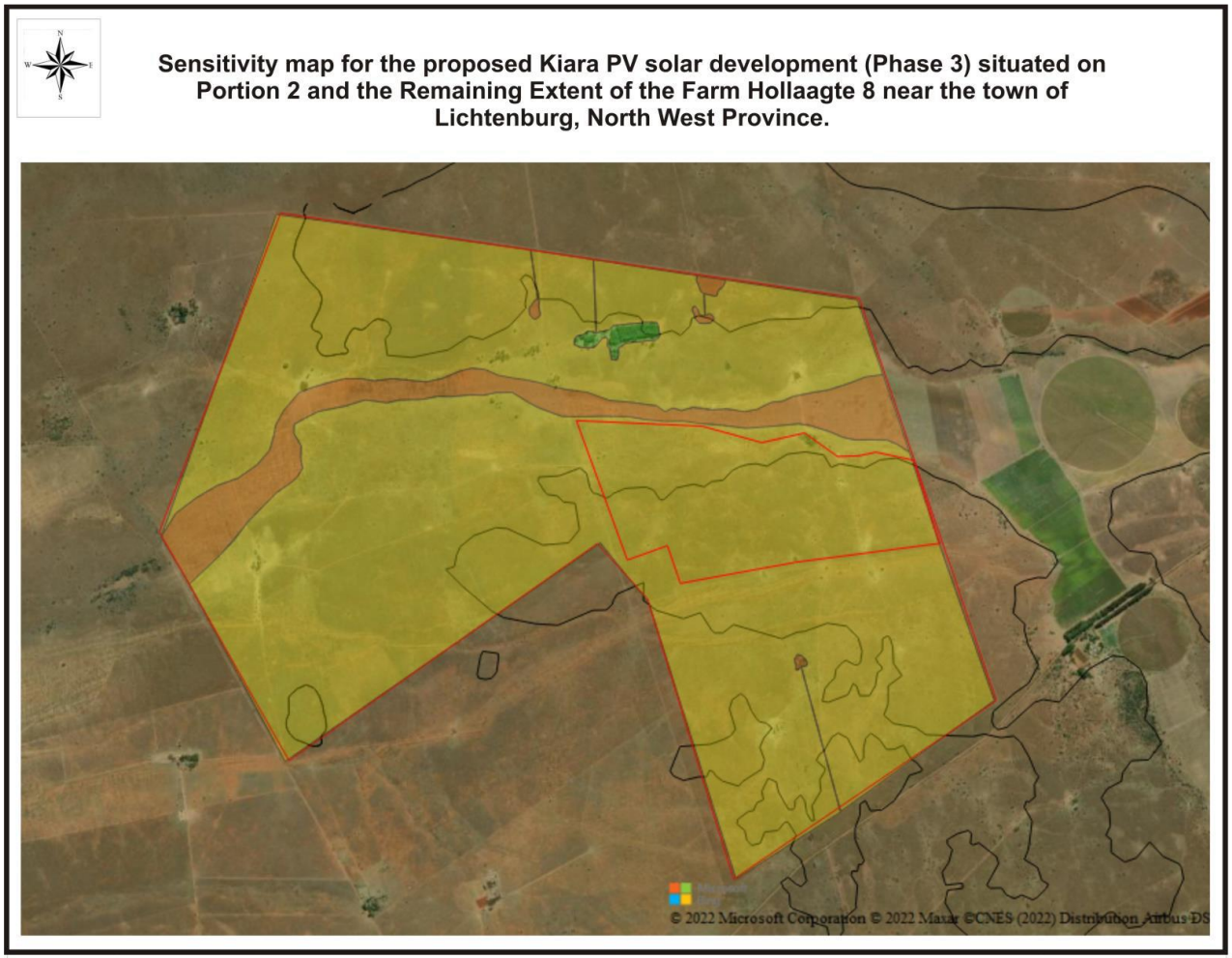
1.1.1 8.2.1 Results of the Terrestrial and Aquatic Ecology Impact Assessment

The majority of the project site still consists of natural grassland which is still in a fairly good condition. Some disturbance is present though in general these are localised or has been able to re-establish a near natural grass layer. The surrounding areas are also largely still natural, and the area is therefore not affected to a large extent by cumulative transformation pressures. However, it is well known that the larger area has been increasingly subjected to applications for solar energy developments and the cumulative impact that this transformation will have will steadily increase over time.

The description of the proposed development area indicates a relatively uniform habitat, with moderate species diversity and largely without any unique habitats or areas of high diversity. Furthermore, the vegetation consists of Carletonville Dolomite Grassland, which although it has a significant species diversity, is currently listed as being of Least Concern (LC) which also does not contribute toward its conservation value. Overall, the vegetation in the study area can therefore not be regarded as exceeding a Moderate level of sensitivity. Areas of localised high conservation value may however still be present, and which may require exclusion from development. The proposed development of Kiara PV3 of the development contains a few such rocky areas containing a notably higher species diversity with less common and protected plant also being present. Kiara PV3 is also located adjacent to the lower lying drainage area which is considered to have a high conservation value.

A few rocky areas occurring in Kiara PV3 of the development and is notably higher in terms of species diversity and protected plant species. These areas also contain uncommon, protected species with a higher

conservation value. Such species included the uncommon succulent, *Euphorbia davyi* and protected succulent, *Orbea lutea subsp. lutea*. Owing to the higher diversity of some of these rocky areas as well as the presence of plant species which are protected and less common, a few of these areas have been designated as having a High level of sensitivity. Furthermore, the Marico Biosphere Reserve also border the study area to the north.



Map 4: Sensitivity map of the proposed Kiara PV solar development (Phase 3) on the Farm Hollaagte 8 near the town of Lichtenburg. The area is fairly uniform with only a moderate habitat and species diversity while the natural vegetation in this area is also listed as being of Least Concern. As a result, the study area is largely regarded as being of Moderate Sensitivity. However, since the vegetation is still natural and in a fairly good condition, the sensitivity cannot be regarded as Low which is only applicable to areas of transformation such a an area occupied by a woodlot of invasive Bluegum trees. The drainage area in the study area is largely devoid of riparian and wetland conditions and is therefore only afforded a High level os sensitivity but since it will be excluded from development, should remain unaffected.

Figure 8.2 Areas of relative sensitivity for the study area with the Kiara PV3 portion indicated (red). Note that the area is generally considered to have a moderate level of sensitivity given the fairly uniform habitat present. The lower lying drainage area (orange) adjacent to the site is indicated. Note also a few rocky areas with higher species diversity considered as having a high level of sensitivity

Description of the Impacts

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. The region around the study area, especially to the north of the site, is still dominated by extensive natural areas and consequently ecosystem functions, habitat fragmentation and the disruption of ecosystem processes is still fairly low. However, the proposed development will also require the transformation of fairly large areas consisting of natural grassland in fairly good condition and will therefore result in significant habitat loss and fragmentation.

No Red Listed plant species could be identified on the site and the area is also not known to contain many such species though a few are still present in this region and a likelihood therefore remains that such a species may also be present on the site. However, given the large extent of the study area, it has been found to contain several protected plant species

During the construction phase, the proposed development will increase disturbance and exacerbate conditions susceptible to the establishment of exotic weeds and invaders.
Removal of vegetation reduces infiltration and promotes runoff, coupled with the rain shadow caused by panels and the resulting dripline, this increases runoff and erosion. This may also have an impact on the drainage system in the study area.

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. Since it is inevitable that the development will involve the transformation of natural grassland this contributes significantly toward habitat loss which in turn will result in a high impact on the mammal population. The area is surrounded by extensive natural areas which will somewhat decrease the impact though the loss of habitat will still result in a decrease in the mammal population size which will essentially result in a reduction in the mammal population of the area. 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. The survey has indicated that though the mammal population will consist largely of widespread, generalist species, it remains possible that some of these Red Listed species may occur in the area.

Construction itself may also affect the mammal population and care should therefore be taken to ensure none of the faunal species on site is harmed. The hunting, capturing or harming in any way of mammals on the site should not be allowed. Voids and excavations may also act as pitfall traps to fauna and these should continuously be monitored and any trapped fauna removed and released in adjacent natural areas.

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

Nature: *Loss of vegetation and consequently habitat and species diversity as a result.*		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Moderate (3)
Duration	Medium-term (5)	Medium - term (5)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)

Significance	**High (80)**	**High (70)**
Status (positive or negative)	Negative	Negative
Mitigation:		
» A few rocky areas occurring in Kiara PV3 of the development and is notably higher in terms of species diversity and protected plant species. These areas also contain uncommon, protected species with a higher conservation value. Such species included the uncommon succulent, *Euphorbia davyi* and protected succulent, *Orbea lutea subsp. lutea*. They therefore have a significant conservation value and it is recommended that at last a portion (approximately 50 %) of these identified rocky areas be excluded from the development in order to conserve a representative sample of these areas of higher diversity which will then also by default conserve the protected species located in these areas.		
Residual Impacts:		
The solar development will involve the clearance of a fairly large area and lead to irreversible transformation of the natural grassland and residual impacts will remain high.		

Nature: *Loss of protected, rare or threatened plant species*		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Moderate (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Low (4)
Probability	Probable (5)	Probable (3)
Significance	**Moderate (80)**	**Moderate (36)**
Status (positive or negative)	Negative	Negative
Mitigation:		
» few rocky areas occurring in Kiara PV3 of the development and is notably higher in terms of species diversity and protected plant species. They therefore have a significant conservation value and it is recommended that at last a portion (approximately 50 %) of these identified rocky areas be excluded from the development in order to conserve a representative sample of these areas of higher diversity which will then also by default conserve the protected species located in these areas. It will however still be necessary to obtain permits and transplant any affected protected species. The portion of these rocky areas being excluded and conserved can also be used as a refugia where those protected plants which are being removed can be transplanted.		
Residual Impacts:		
Despite comprehensive mitigation (dependant on this mitigation being successfully implemented) a residual loss of some protected species is still unavoidable.		

Nature: *Impacts on watercourses, wetlands or the general catchment*		
	Without mitigation	**With mitigation**
Extent	Moderate (4)	Low (3)
Duration	Medium-term (5)	Medium-term (5)
Magnitude	Low (4)	Very – Low (4)
Probability	Probable (4)	Improbable (2)
Significance	**Moderate (52)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Mitigation:		
» Should this drainage systems be excluded from the development and measures as indicated 61 implemented the anticipate impact should remain low. Refer to the risk assessment for a more detailed discussion on the likely risks and impacts that the development will have on this drainage areas. Given		

that the majority of this drainage system is devoid of riparian and wetland conditions and the already modified condition of the system it is highly unlikely that the development will have a large impact on it.
Residual Impacts: Should the drainage area be regarded as a no-go area and measures as indicated implemented the anticipated impact will be low though it remains likely that some increased erosion and sedimentation will remain and there will therefore remain a low residual impact.

Nature: Impact that the development will have on exotic weeds and invasive species, both current and anticipated conditions		
	Without mitigation	**With mitigation**
Extent	Moderate (4)	Moderate (3)
Duration	Long – term (4)	Short-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Moderate (56)**	**Moderate (30)**
Status (positive or negative)	Negative	Negative
Mitigation: » It is recommended that weed control be judiciously and continually practised. Monitoring of weed establishment should form a prominent part of management of the development area. Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.		
Residual Impacts: Without mitigation this will significantly increase the establishment of exotics and is likely to spread into the surrounding areas.		

Nature: Any increased erosion that the development may cause.		
	Without mitigation	**With mitigation**
Extent	Moderate (4)	Moderate (3)
Duration	Long – term (4)	Short-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Moderate (56)**	**Moderate (33)**
Status (positive or negative)	Negative	Negative
Mitigation: » In order to reduce this impact, the development should implement a comprehensive storm water management system which should ensure that the surface runoff patterns are retained as is, especially pertaining to solar panels, and that the development does not contribute toward increased surface flow, erosion and any impacts on downslope areas. » Any erosion recorded on site must be appropriately managed as soon as possible. » Erosion control measures should be maintained on a continuous basis throughout the construction and operation phases.		
Residual Impacts: Erosion may still have a significant impact on the drainage system in the study area.		

Nature: Fragmentation of habitat, disruption of ecological connectivity and functioning in terms of the surrounding areas		
	Without mitigation	**With mitigation**

Extent	Moderate (4)	Moderate (3)
Duration	Long – term (5)	Medium-term (5)
Magnitude	Moderate (5)	Moderate (5)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Moderate (56)**	**Moderate (52)**
Status (positive or negative)	Negative	Negative

Mitigation:

» A portion of the study area consists of an Ecological Support Area 1 (ESA) and functions as part of an ecological corridor. The development will therefore also impact on this functioning. Mitigation can however be implemented in order to provide some manner of continued corridor. In order to mitigate the loss of a portion of this corridor, the development can also consider implementing measures to allow for fauna to still use the area as a corridor. Solar developments are often surrounded by extensive fences but this development should also consider implementing measures to allow for small mammals to cross between these fences, i.e. wildlife permeable fencing or wildlife passages.

Residual Impacts:

The area is largely still dominated by natural grassland in fairly good condition and it is unavoidable that the development will result in transformation of a significant portion of natural grassland and consequently the residual impact on habitat fragmentation and the loss of ecosystem processes would remain significant.

Nature: Impacts that will result on the mammal population on and around the site.

	Without mitigation	**With mitigation**
Extent	Moderate (4)	Moderate (4)
Duration	Long – term (5)	Medium-term (5)
Magnitude	Moderate (7)	Moderate (7)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**High (64)**	**Moderate (64)**
Status (positive or negative)	Negative	Negative

Mitigation:

» Construction itself may affect the mammal population and care should therefore be taken to ensure none of the faunal species on site is harmed. The hunting, capturing or harming in any way of mammals on the site should not be allowed. Voids and excavations may also act as pitfall traps to fauna and these should continuously be monitored and any trapped fauna removed and released in adjacent natural areas.

» Strict speed limits should be implemented on site to avoid any impacts on fauna.

Cumulative Impacts:

The surrounding areas are largely still natural and the area is therefore not affected to a large extent by cumulative transformation pressures. However, it is well known that the area has been increasingly subjected to applications for solar energy developments and the cumulative impact that this transformation will have will steadily increase over time. The proposed development will also entail an extensive total extent of approximately 1600 hectares and though each development phase does not cover a large area, cumulatively the development will have a high impact. As a result the cumulative impact on the mammal populations will remain significant.

Residual Impacts:

Transformation of the indigenous vegetation on the site will result in a decrease in the mammal population size as available habitat decreases and consequently the residual impact will remain high.

1.1.2 8.2.4 Overall Result

The impact significance has been determined and indicates that the majority of impacts will remain moderate such as the impact on protected plant species, the drainage system, infestation by exotic weeds, erosion and habitat fragmentation. If the mitigation measures are adequately implemented, these impacts can be further decreased. However, since the area of development is fairly large and still consists of natural vegetation in a relatively good condition the impact on vegetation and diversity loss as well as the impact

on the mammal population will remain high. As such, the PV facility and associated infrastructure would be considered to be acceptable and can therefore be authorised.

8.3 Potential Impacts on Avifauna

Considering the anthropogenic activities and influences within the landscape, several negative impacts to biodiversity were observed within the assessment area. These include:

- Erosion and loss of habitat as a result of overgrazing.
- Grazing and trampling of natural vegetation by livestock.
- Litter.
- Invasive alien plant species.
- Farm roads and main roads (and associated traffic and wildlife road mortalities);
- Powerlines.
- Fences; and
- Loss of indigenous flora and associated edge effects from existing infrastructure.

Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details).

8.3.1 Results of the Avifauna Impact Assessment

Seventy-four (74) bird species were recorded in and around the study area with 68 species recorded from point counts and a 7 species recorded as incidental sightings. Two SCC were recorded from the sample sites (not within the project area): Greater Flamingo ((*Phoenicopterus ruber*) and Cape Vulture (*Gyps coprotheres*).

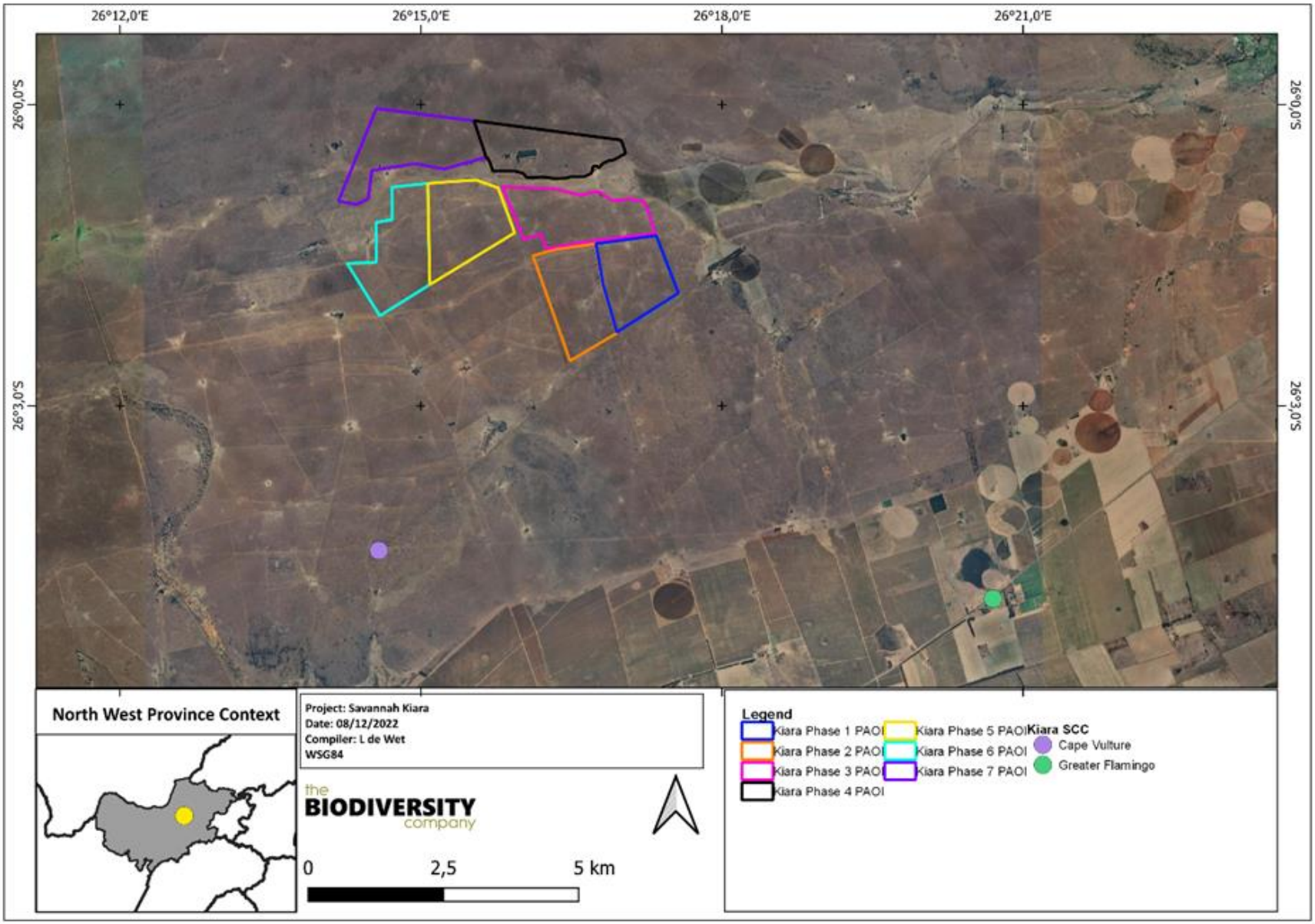


Figure 8.3: Map indicating the location of the SCC recorded from the PAOI and surrounds.

Four (4) habitats were delineated within the site and surrounds. These are summarised in **Table 8.1** and illustrated in **Figure 8.4**.

Table 8.1: Summary of the habitat types delineated within the Project Area of Influence and their key ecosystem services provided

Habitat	Description	Key Ecosystem Services
Transformed	Little to no functional vegetation remaining. Characterised by development and cleared land.	Foraging for common fauna species.
Degraded Grassland	Grassland vegetation of a low functionality that has been historically impacted by the edge effects of nearby development, heavy grazing, erosion, and human and vehicle ingress.	Foraging for fauna species, erosion control and basic nutrient cycling and grazing land.
Grassland	Functional grassland vegetation that may be considered intact habitat, important for supporting key ecosystem services and providing habitat connectivity between protected areas and CBAs.	Foraging and nesting resources for fauna, including potential SCC. Important erosion control and soil nutrient cycling processes. Habitat connectivity and carbon sequestration.
Bush Clumps	Functional bush clump vegetation forming isolated clumps that provide niche habitats and islands for certain species. Dominated by thorny shrubs.	Foraging and nesting resources for fauna, including potential SCC. Important erosion control and soil nutrient cycling processes and carbon sequestration.

Site Ecological Importance (SEI) was determined for each of the habitats defined above.

Table 8.2: Summary of habitat types delineated within the field assessment area of the project

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Very Low	Very Low	Very Low	Very High	**Very Low**
	No natural habitat remaining.	Several major current negative ecological impacts.			
Degraded Grassland	Very Low	Low	**Very Low**	High	**Very Low**
	No confirmed and highly unlikely populations of SCC.	Several minor and major current negative ecological impacts.		Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor	

Grassland	Medium > 50% of receptor contains natural habitat with potential to support SCC.	Medium Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor	**Medium**
Bushclumps	Low No confirmed or highly likely populations of SCC.	Low Small (> 1 ha but < 5 ha) area.	**Low**	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor	**Low**

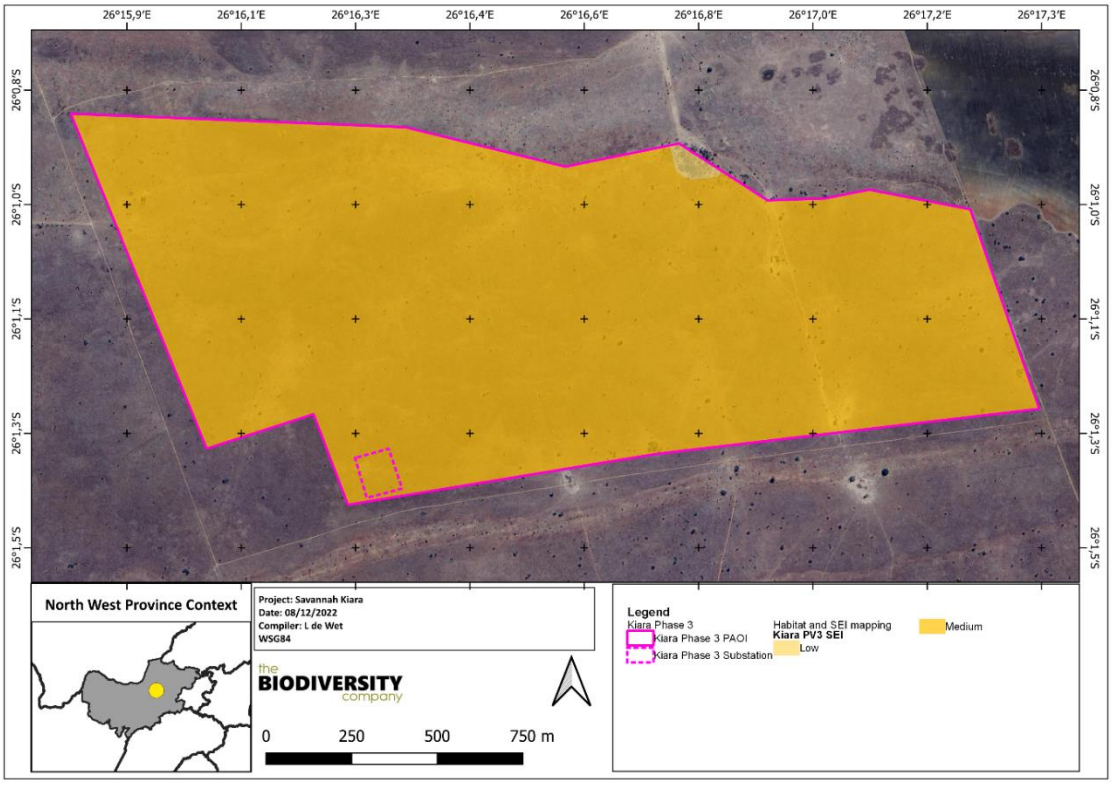


Figure 8.4: Map illustrating the sensitivities of the habitats delineated within the larger study area.

8.3.2 Description of the Impacts

Construction Phase

The construction of the associated infrastructure and the PV site has been assessed collectively as their impacts overlap. The following potential impacts were considered (**Error! Reference source not found.**to REF _Ref121751790 \h * MERGEFORMAT **Error! Reference source not found.**):

- Habitat Loss (Destruction, fragmentation and degradation of habitats, ultimately displacing avifauna);
- Sensory disturbances (e.g., noise, dust, light, vibrations);
- Collection of eggs and poaching (especially of SCC);
- Roadkill; and
- Chemical pollution associated with dust suppressants

Operational Phase

The operational phase of the impact of daily activities is anticipated to lead to collisions and electrocutions. Moving vehicles do not only cause sensory disturbances to avifauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions. The area surrounding the direct footprint will be maintained to prevent uncontrolled events such as fire. This practice will however result in the disturbance and displacement of breeding and non-breeding species. The following potential impacts were considered:

- Continued habitat loss (destruction, fragmentation and degradation of habitat ultimately displacing avifauna);
- Sensory disturbance (e.g., noise, dust, light and vibrations);
- Collection of eggs and poaching (especially of SCC);
- Roadkill;
- Collisions with PV panels, associated powerlines and connection lines and fences;
- Electrocution by infrastructure and connections to PV;
- Chemical pollution associated with chemicals to keep PV panels clean; and
- Fencing of the PV site (especially a risk for larger birds).

Decommissioning Phase

This phase is when the scaling down of activities ahead of temporary or permanent closure is initiated. During this phase, the operational phase impacts will persist until of the activity reduces and the rehabilitation measures are implemented. The following potential impacts were considered:

- Habitat loss (continued fragmentation and degradation of habitats);
- Sensory Disturbance (e.g., noise, dust, light, vibrations);
- Roadkill;
- Collisions with PV and associated infrastructure; and
- Fencing of PV site (especially a risk for larger birds).

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

Construction Phase

Nature: Habitat Loss **Destroy, fragment, and degrade habitat, ultimately displacing avifauna** The loss of habitat in the project footprint cannot be negated but can be restricted to some extent. The loss of habitat will result in the loss of territory, feeding area, nesting sites and prey availability for numerous species.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Short term (2)	Very short term (1)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High (65)**	**Medium (45)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
The habitat outside the footprint can be protected by implementing the following mitigations: » Construction activity to only be within the project footprint and the area is to be well demarcated. » Areas where vegetation has been cleared must be re-vegetated within local indigenous plant species. » The affected area must be monitored for invasive plant encroachment and erosion and must be controlled. » The use of laydown areas within the development footprint must be used, to avoid habitat loss and disturbance to adjoining areas. » All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. » Should any Species of Conservation Concern not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.		
Residual Impacts: The loss of habitat is a residual impact that is unavoidable. The disturbance may also cause some erosion and invasive alien plant encroachment. Movement corridors will be disrupted in the area. Residual impacts are low		

Nature: Sensory disturbances **Disturbance resulting from noise, dust, light and vibrations**		
	Without mitigation	**With mitigation**
Extent	High (4)	Moderate (3)
Duration	Short term (2)	Very short term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
» Minimise disturbance impact by abbreviating construction time.		

» Schedule the activities to avoid breeding and movement time. » Ensure lights are kept to a minimum, lights must be red or green and not white to reduce confusion for nocturnal migrants. Lights should be placed so that they face downward onto working areas and not straight or upward to reduce the sky glow effect. » Dust management need to be done in the areas where the vegetation will be removed, this includes wetting of the soil.
Residual Impacts: The mitigation of noise pollution during construction is difficult to mitigate against, however carefully managing this noise, dust and light pollution can reduce the overall impact. Residual impacts are Low.

Nature: Loss of avifauna **Collection of eggs and poaching, especially of SCC**		
	Without mitigation	**With mitigation**
Extent	Low (2)	Very low (1)
Duration	Short term (2)	Very short term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: » All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. » Signs must be put up stating that should any person be found poaching any species they will be fined.		
Residual Impacts: There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers. Residual impacts are Low.		

Nature: Loss of avifauna **Roadkill**		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Short term (2)	Very short term (1)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

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

Residual Impacts:

Roadkill will remain a possibility with mitigation with a residual impact of Low.

Nature: Chemical Pollution

Chemical Pollution associated with dust suppressants leading to direct mortalities or habitat loss resulting in a disruption of avifauna populations.

	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Short term (2)	Very short term (1)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» Environmentally friendly dust suppressants must be utilised.

Residual Impacts:

Should mitigation measures be followed, this impact can be reduced to a residual impact of Low.

Operation Phase

Nature: Continued fragmentation and degradation of habitats and ecosystems

Disturbance created during the construction phase will leave the development area vulnerable to erosion and Invasive Alien Plant (IAP) encroachment.

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

Mitigation:

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

Residual Impacts:

Mitigation measures can reduce this impact to a Low residual impact.

Nature: Sensory disturbances
Disturbance resulting from noise, dust, light and vibrations

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

Mitigation:

» Schedule the activities to avoid breeding and movement time.
» Ensure lights are kept to a minimum, lights must be red or green and not white to reduce confusion for nocturnal migrants. Lights should be placed so that they face downward onto working areas and not straight or upward to reduce the sky glow effect.
» Dust management need to be done in the areas where the vegetation will be removed, this includes wetting of the soil.

Residual Impacts:

Carefully managing this noise, dust and light pollution can reduce the overall impact. Residual impacts are Low.

Nature: Loss of avifauna
Collection of eggs and poaching, especially of SCC

	Without mitigation	**With mitigation**
Extent	Low (2)	Very low (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

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

Residual Impacts:

There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers. Residual impacts are Low.

Nature: Loss of avifauna
Roadkill

	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

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

Residual Impacts:

Roadkill will remain a possibility with mitigation with a residual impact of Low.

Nature: Collisions
Collisions with PV panels and associated infrastructure

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

Mitigation:

» The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa.
» Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines. White strips must be placed on the edge of the solar panels to reduce reflection and prevent collisions.
» Bird Flappers and diverters must be placed along the whole of the powerlines, this must be done at 5 m intervals.
» Fencing mitigations:
- Top 2 strands must be smooth wire
- Routinely retention loose wires
- Minimum 30cm between wires
- Place markers on fences

Residual Impacts:

Some collisions may occur despite mitigations with a residual impact of Medium

Nature: Electrocutions

Electrocution by infrastructure and connections to PV

	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

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

Residual Impacts:

Electrocutions may occur despite mitigation measures resulting on a residual impact of Low.

Nature: Chemical Pollution

Chemical Pollution associated with chemicals used to clean PV panels leading to direct mortalities or habitat loss resulting in a disruption of avifauna populations.

	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Minor (2)

Probability	Probable (3)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Environmentally friendly cleaning chemicals must be utilised.		
Residual Impacts: Should mitigation measures be followed, this impact can be reduced to a residual impact of Low.		

Nature: Fencing **Fencing of the PV site holds risks for large avifauna species in particular**		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Top 2 strands must be smooth wire. » Routinely retention loose wires. » Minimum 30cm between wires. » Place markers on fences.		
Residual Impacts: This impact cannot be fully mitigated, resulting in a residual impact of Low		

Decommissioning Phase Impacts

Nature: *Continued fragmentation and degradation of habitats and ecosystems* Disturbance created during the construction and operational phases will leave the development area vulnerable to erosion and Invasive Alien Plant (IAP) encroachment.		
	Without mitigation	**With mitigation**
Extent	Low (2)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

» Implementation of a rehabilitation plan.
» Implementation of an alien invasive management plan and monitoring on an annual basis for 3 years post construction.
» There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.
» If permanently closed; all infrastructure must be removed, and the area rehabilitated.

Residual Impacts:

No significant residual risks are expected, although IAP encroachment and erosion might still occur but would have a negligible impact if effectively managed.

Nature: Sensory disturbances
Disturbance resulting from noise, dust, light and vibrations

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

Mitigation:

» Minimize disturbance impact by abbreviating construction time
» Schedule the activities to avoid breeding and movement times report
» Dust management need to be done in the areas where the vegetation will be removed, this includes wetting of the soil. This area must be rehabilitated as soon as possible.
» All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the decommissioning area.
» All vehicles (construction or other) accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g., nightjars and owls) which sometimes forage or rest on roads, especially at night.

Residual Impacts:

If this impact is mitigated and monitored correctly there should be no residual impacts.

Nature: Loss of avifauna
Roadkill

	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation: » All vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the project area. » All vehicles accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g., nightjars and owls) which sometimes forage or rest on roads, especially at night. » Signs must be put up on the roads indicating a 40km/h speed limit
Residual Impacts: Roadkill will remain a possibility with mitigation with a residual impact of Low.

8.3.4 Overall Result

The assessment area consists of four avifauna habitats; transformed areas, degraded grassland, grassland and bushclumps. These habitats were still mostly in a natural state with the exception of some areas that have been disturbed by livestock grazing and transformed due to anthropogenic activities. Two SCC were confirmed in the assessment area and surrounds Cape Vulture (*Gyps coprotheres*) and Greater Flamingo (*Phoenicopterus roseus*) (which is likely to fly over the assessment area). There is a possibility that additional conservation important and sensitive vulture species occur within the project area. Some high-risk avifauna species were recorded from the project area and surrounds, including both raptors and water birds.

The project will result in habitat loss and degradation of avifaunal habitats. The development will lead to the clearing of vegetation and an altering in the undeveloped nature of the area. Based on the medium receptor resilience and the medium functional integrity, the assessment area was given a medium to low site ecological importance with transformed areas having a very low site ecological importance (SEI).

The development will also lead to sensory disturbance, collision and electrocution risks. Even though the latter three impacts can be effectively mitigated, the loss of habitat cannot be mitigated. Considering the number of applications and current solar plant developments in the area the cumulative impact is regarded as being high.

Mitigation measures that have provided have resulted in the reduction of most impacts to a Moderate or Low, which is considered within the limits of acceptable change. It is the opinion of the specialist that the project may be considered for approval, but all prescribed mitigation measures and monitoring must be considered by the issuing authority. Any power lines that may be developed must be extensively mitigated due to the presence of a vulture restaurant in the vicinity.

8.4 Assessment of Impacts on Soils and Agricultural Potential

The development of the Kiara PV3 Facility is likely to result in a variety of impacts from a soils and agricultural potential perspective. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** or more details).

8.4.1 Results of the Soils and Agricultural Potential Assessment

The soil profiles classified within the Kiara PV3 development area consist of the Hutton, Glenrosa and Mispah soil forms. The largest part of the Kiara PV3 development area consists of land with Low-Moderate to Moderate (Class 06 and 07) land capability. This land capability class is present within the entire boundary of the development area while smaller areas of land Moderate (Class 08) are scattered in between. A small

section of land with Moderate-High (Class 09) land capability is located along the western part of the northern boundary.

Sensitivity analysis

The sensitivity delineation of the proposed Kiara PV3 development area, following the on-site verification visit, is shown in **Figure 8.5.**

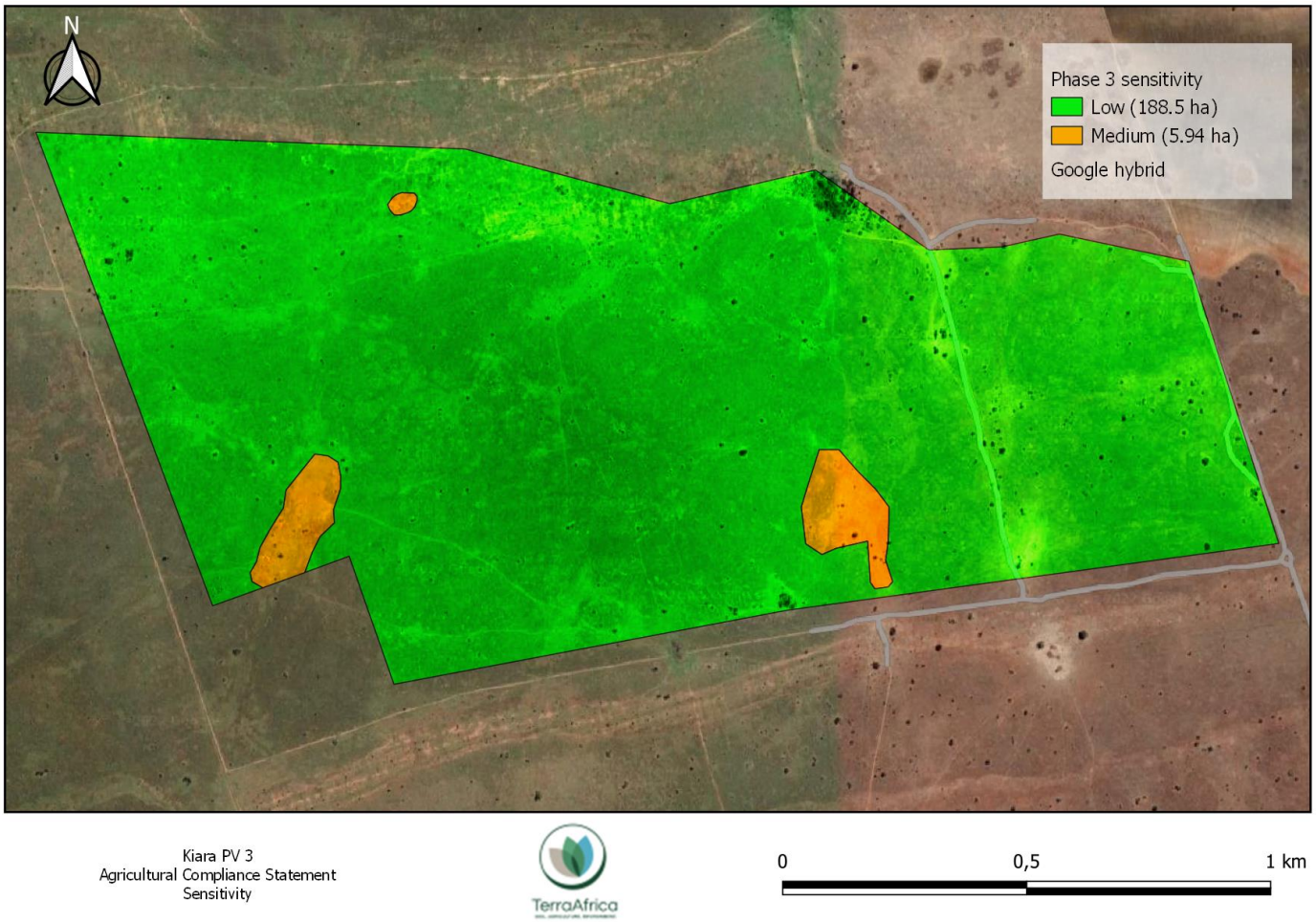


Figure 8.5 Agricultural sensitivity rating of the proposed Kiara PV3 facility development area

Following the consideration of all the desktop and gathered baseline data above, the findings of the report are not the same as the Environmental Screening Tool. The soil forms present within the project area are mainly of the Mispah soil form, which has a shallow soil depth of between 100-200mm. The area has neither historically nor recently been used for crop production, as confirmed by the field crop boundary data of DALRRD (2019). No irrigation infrastructure, such as centre pivots or drip irrigation, are present within the project area and irrigated agricultural is currently not practiced in the area.

The largest part of the total area assessed, has Low agricultural potential (159ha). Low agricultural potential has been assigned to soils of the Mispah and Glenrosa forms because of the shallow soil depth. Moderate agricultural potential is allocated to the Hutton soil form due to its deep soil depth and was found in the north-western part of the study area (6ha). The low agricultural potential of the soils within the development area is confirmed by the absence of crop field boundaries within the Kiara PV 3 development area.

Soil in the project area will have Low sensitivity, depending on the successful implementation of mitigation measures to prevent soil erosion, compaction, and pollution.

Micro-siting of infrastructure layout

Prior to the finalisation of the infrastructure layout as depicted, the layout went through a process of micro-siting that considered all the environmental sensitivities as communicated by the different specialists working on the project. This resulted in the exclusion of land along the western and northern boundaries of the development area as well as two isolated sections in the middle of the site. It can therefore be confirmed that the current layout does not result in the fragmentation of any crop fields and only affects grazing land with Low agricultural sensitivity.

Allowable development limits

Following the sensitivity delineation, the allowable development limits for the development area was calculated. The results show that the current layout and development footprint of the proposed Kiara PV3 Facility, does not exceed the allowable development limits.

Table 8.2 Calculated allowable development limits according to the confirmed project site sensitivity

Sensitivity class	Area that will be affected by development footprint (ha)	Allowable limit (ha/MW)	Area allowed for a 120MW development (ha)	Area that exceeds allowable limit (ha)
Medium	4	0.35	35	0
Low	172	2.50	250	0

8.4.2 Description of Impacts

The most significant impacts of the proposed project on soil and agricultural productivity will occur during the construction phase when the vegetation is removed, and the soil surface is prepared for the delivery of materials and assembly of the infrastructure. During the operational phase, the risk remains that soil will be polluted by the waste generated or in the case of a spill incident. During the decommissioning phase, soil will be prone to erosion when the infrastructure is removed from the soil surface.

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

Construction Phase Impacts

Nature: Change in land use from livestock farming to energy generation Prior to construction of the project infrastructure, the PV development area will be fenced off and livestock farming will be excluded from 195ha of land. The area where the access road will be constructed will be stripped of vegetation and will no longer be suitable for livestock grazing.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium duration (3)	Medium duration (3)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (4)	Definite (4)
Significance	**Medium (40)**	**Medium (32)**
Status (positive or negative)	Negative	Negative

Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	N/A

Mitigation:

» Vegetation clearance must be restricted to areas where infrastructure is constructed.
» No materials removed from development area must be allowed to be dumped in nearby livestock farming areas.
» Prior arrangements must be made with the landowners to ensure that livestock and game animals are moved to areas where they cannot be injured by vehicles traversing the area.
» No boundary fence must be opened without the landowners' permission.
» All left-over construction material must be removed from site once construction on a land portion is completed.
» No open fires made by the construction teams are allowable during the construction phase.

Residual Impacts:

The residual impact from the construction of the Kiara PV3 Facility and Associated Infrastructure is considered medium.

Impact:

Nature: Soil erosion

All areas where vegetation is removed from the soil surface in preparation for the infrastructure construction will result in exposed soil surfaces that will be prone to erosion. Both wind and water erosion are a risk, as the area falls within a region that experiences thunderstorms in the summer months and sometimes strong winds during the dry winter months, especially August and September.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

» Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint;
» Unnecessary land clearance must be avoided;
» Level any remaining soil removed from excavation pits (where the PV modules will be mounted) that remained on the surface, instead of allowing small stockpiles of soil to remain on the surface;
» Where possible, conduct the construction activities outside of the rainy season; and
» Stormwater channels must be designed to minimise soil erosion risk resulting from surface water runoff.

Residual Impacts:

The residual impact from the construction and operation of the project on the susceptibility to erosion is considered low.

Impact:

Nature: Soil compaction

The clearing and levelling of land for construction of the infrastructure will result in soil compaction. In the area where the access roads and substation will be constructed, topsoil will be removed, and the remaining soil material will be deliberately compacted to ensure a stable surface prior to construction.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

» Vehicles and equipment must travel within demarcated areas and not outside of the construction footprint;
» Unnecessary land clearance must be avoided;
» Materials must be off-loaded and stored in designated laydown areas;
» Where possible, conduct the construction activities outside of the rainy season; and
» Vehicles and equipment must park in designated parking areas.

Residual Impacts:

The residual impact from the construction and operation of the project on soil compaction is considered low.

Nature: Soil pollution

During the construction phase, construction workers will access the land for the preparation of the terrain and the construction of the thermal plant and access road. Potential spills and leaks from construction vehicles and equipment and waste generation on site can result in soil pollution.

The following construction activities can result in the chemical pollution of the soil:

1. Petroleum hydrocarbon (present in oil and diesel) spills by machinery and vehicles during earthworks and the removal of vegetation as part of site preparation;
2. Spills from vehicles transporting workers, equipment, and construction material to and from the construction site;
3. The accidental spills from temporary chemical toilets used by construction workers;
4. The generation of domestic waste by construction workers;
5. Spills from fuel storage tanks during construction;
6. Pollution from concrete mixing;
7. Pollution from road-building materials; and
8. Any construction material remaining within the construction area once construction is completed.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Low (4)	Improbable (2)
Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

» Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills;
» Any waste generated during construction must be stored into designated containers and removed from the site by the construction teams;

» Any left-over construction materials must be removed from site; » The construction site must be monitored by the Environmental Control Officer (ECO) to detect any early signs of fuel and oil spills and waste dumping; » Ensure battery transport and installation by accredited staff / contractors; and » Compile (and adhere to) a procedure for the safe handling of battery cells during transport and installation.
Residual Impacts: The residual impact from the construction and operation of the proposed project will be low to negligible.
Cumulative Impacts: Any additional infrastructure that will be constructed to strengthen and support the operation of the Kiara PV facility and waste not removed to designated waste sites will increase the cumulative impacts associated with soil pollution in the area.

Operational Phase Impacts

During the operational phase, staff and maintenance personnel will access the project area daily. The following impacts on soil are expected for this phase:

Nature: Soil erosion The areas where vegetation was cleared will remain at risk of soil erosion, especially during a rainfall event when runoff from the cleared surfaces will increase the risk of soil erosion in the areas directly surrounding the project area.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: » The area around the project, including the internal access roads, must regularly be monitored to detect early signs of soil erosion on-set; and » If soil erosion is detected, the area must be stabilised using geo-textiles and facilitated re-vegetation.		
Residual Impacts: The residual impact from the operation of the project on the susceptibility to erosion is considered low.		
Cumulative Impacts: Any additional infrastructure that will be constructed to strengthen and support the operation of the project will result in additional areas exposed to soil erosion through wind and water movement.		

Nature: Soil pollution During the operational phase, potential spills and leaks from maintenance vehicles and equipment and waste generation on site can result in soil pollution. Also, any spillages around the workshop area or damaged infrastructure, such as inverters and transformers, can be a source of soil pollution.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Low (4)	Improbable (2)

Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: » Maintenance must be undertaken regularly on all vehicles and maintenance machinery to prevent hydrocarbon spills; » No domestic and other waste must be left at the site and must be transported with the maintenance vehicles to an authorised waste dumping area; and » Regularly monitor areas alongside the roads, parking area and workshop for any signs of oil, grease and fuel spillage or the presence of waste.		
Residual Impacts: The residual impact from the operation of the proposed project will be low to negligible.		
Cumulative Impacts: The operation of any additional infrastructure to strengthen and support the operation of the Kiara PV facility and waste not removed to designated waste sites will increase the cumulative impacts associated with soil pollution in the area.		

Decommissioning phase

The decommissioning phase will have the same impacts as the construction phase i.e. soil erosion, soil compaction and soil pollution. It is anticipated that the risk of soil erosion will especially remain until the vegetation growth has re-established in the area where the project infrastructure was decommissioned.

8.4.4 Overall Result

The largest part of the total area assessed, has Low agricultural potential (172ha). Low agricultural potential has been assigned to soils of the Mispah and Glenrosa forms because of the shallow soil depth. Moderate agricultural potential is allocated to the Hutton soil form due to its deep soil depth and was found in the north-western part of the study area (4ha). The low agricultural potential of the soils within the development area is confirmed by the absence of crop field boundaries within the Kiara PV3 development area.

It is anticipated that the construction and operation of the Kiara PV3 Facility will have impacts that range from medium to low. Through the consistent implementation of the recommendation mitigation measures, most of impacts can all be reduced to low. It is my professional opinion that this application be considered favourably, permitting that the mitigation measures are followed to prevent soil erosion and soil pollution and to minimise impacts on the veld quality of the farm portions that will be affected. The project infrastructure should also remain within the proposed development area that will be fenced off.

8.5 Assessment of Impacts on Heritage Resources (including archaeology, palaeontology and cultural landscape)

Potential impacts on heritage resources and the relative significance of the impacts associated with the development of the Kiara PV3 Facility are summarised below (refer to **Appendix G)**.

8.5.1 Results of the Heritage Impact Assessment

Archaeology

No stone age archaeological resources were identified during the field assessment despite the presence of abundant raw material sources. In other nearby projects, Stone Age archaeological resources that were identified were graded as having low levels of scientific significance. As such, it is very unlikely that the proposed development will impact on significant Stone Age archaeological heritage.

A number of stone structures were identified within the study area. These have been categorised as either kraals or ruins of varying heritage value. Where the kraals and ruins form part of a cluster of resources, these have been graded as IIIC for their historical contextual significance and their contribution to the cultural landscape. It is recommended that a no-development buffer of 20m is implemented around these Grade IIIC structures. Where ruins or kraals are isolated on the landscape, their heritage value is limited and as such, these have been graded as Not Conservation-Worthy (NCW).

A number of graves were identified within the areas proposed for development. All the graves are ascribed high local levels of cultural value and as such, are graded IIIA. It is important that human remains are not disturbed through the process of construction of this development.

The clusters of resources have been mapped with their recommended no-go buffer areas in the maps above. In order to conserve the integrity of the relationship between the kraals, ruins and graves, it is recommended that the clusters as mapped are considered to be no-go areas for the proposed development.

Palaeontology
Geological units within the development area range from very highly sensitive dolomites of the Monte Christo Formation of the Malmani Subgroup to moderately sensitive, recent, alluvium.

Following observations during the field investigation as well as data obtained from previous palaeontological impact assessments in this region, it is our professional opinion that significant stromatolites from the Malmani Subgroup are abundantly present in this area.

The excavations for the construction of the proposed Kiara PV3 Facility will most probably expose some sediments that are very highly sensitive geological formations and some sites revealed evidence of very highly significant remains of fossils. A significant part of the excavation project will cut into rocks of the Malmani Subgroup, Chuniespoort Group of the Transvaal Supergroup. This unit has a very high sensitivity for palaeontological heritage. Impacts to the sensitive geology can be mitigated through the implementation of the attached Chance Fossil Finds Procedure for the duration of construction activities

8.5.2 Description of Impacts

The following impacts are expected from a heritage perspective:

» Possible destruction of archaeological heritage.
» Possible destruction of palaeontological heritage.

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

Construction Phase Impacts

Archaeology and palaeontology

Nature: Impact to heritage resources The construction phase of the project will require excavation, which may impact on heritage resources if present.				
		Archaeology		**Palaeontology**
Magnitude	High (8)	Kraals, graves and ruins of heritage significance were identified within the development area. These features are related and should be considered as one site.	High (8)	The area proposed for development is underlain by sediments of very high palaeontological sensitivity although no specific areas for exclusion have been identified within the development footprint
Duration	High (5)	Where an impact to a resources occurs, the impact will be permanent.	High (5)	Where an impact to resources occurs, the impact will be permanent.
Extent	Low (1)	Localised within the site boundary	Low (1)	Since only the possible fossils within the area would be microscopic blue-green algae in some stromatolites, the spatial scale will be localised within the site boundary.
Probability	High (5)	It is likely heritage resources are would be found in the development area	High (5)	It is likely fossils would be found in the development area
Significance		**High (70)**	**High (70)**	
Status		Negative	Negative	
Reversibility		Any impacts to heritage resources that do occur are irreversible.		Any impacts to heritage resources that do occur are irreversible.
Irreplaceable Loss of Resources		Possible		Possible
Can impacts be mitigated		Yes		Yes
Post Mitigation Significance		Low (14)		Low (14)
Mitigation:				

» The areas recommended for exclusion must be excluded from the development as no-go areas. » The Chance Fossil Finds Procedure must be implemented. » Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.
Residual Risk: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.

1.1.3 8.5.4 Overall Result

The findings of this field assessment largely correlate with the findings of other specialists from studies conducted in the area. No significant stone age archaeological resources were identified. A number of stone structures were identified within the development area. Some of these are indicative of historic occupation of the area in the form of ruins, old structures and stone kraals. These have been graded as having low local significance due to their contribution to the history of the broader context. Other such features represent burials and burial grounds. These features have high levels of local significance and may not be impacted by the development activities.

Where there is a clear spatial relationship between the kraals, ruins and graves, these have been mapped as clusters of high sensitivity in the maps above. In order to conserve the integrity of the relationship between the kraals, ruins and graves, it is recommended that the clusters as mapped are considered to be no-go areas for the proposed development.

While the area proposed for development is underlain by geological sediments of very high palaeontological sensitivity, no fossil outcrops requiring conservation were identified within the area proposed for development.

However, it is recommended that the Chance Fossil Finds Procedure be implemented for the duration of construction activities on site.

There is no objection to the proposed development of the Kiara PV3 Facility on heritage grounds on condition that:

» Chance Fossil Finds Procedure must be implemented for the duration of the construction phase of the project.
» Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

8.6 Visual Impact Assessment

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

8.6.1. Results of the Visual Impact Assessment

The result of the viewshed analysis for the proposed facility is shown on **Figure 8.6**. The viewshed analysis was undertaken from a representative number of vantage points within the development footprint at an offset of 5m 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 (PV panels, inverters, BESS, etc.) associated with the facility.

Figure 8.6 also indicates proximity radii from the development footprint in order to show the viewing distance (scale of observation) of the facility in relation to its surrounds.

The viewshed analysis includes the effect of vegetation cover and existing structures on the exposure of the proposed infrastructure.

Results

It is clear that the relatively constrained dimensions of the PV3 facility would amount to a fairly limited area of potential visual exposure. The visual exposure would largely be contained within a 6km radius of the proposed development site, with the predominant exposure to the north-east.

The following is evident from the viewshed analyses:

0 – 1km

The potential visual exposure of the facility is contained to a core area on the site itself and within a 1km radius thereof. There are no residences or secondary roads indicated within this zone.

1 – 3km

Potential visual exposure in the short to medium distance (i.e. between 1 and 3km), is scattered throughout this radius but is more concentrated towards the north and east of the Kiara PV3 facility. Homesteads Witstinkhoutboom 2 (south east of the PV3 Facility), as well as Hollaagte 3 (south west of the PV3 Facility) are found within this zone and do not appear to show any potential visibility. However, homestead Hollaagte 4 (west of the PV3 Facility) lies within an area that may be prone to potential visibility in patches due to the undulating nature of the topography. The Manana secondary road south east of the site shows some potential visibility in sporadic and intermittent patches towards the eastern end of this zone.

3 - 6km

Within a 3 – 6km radius, the visual exposure becomes very scattered and interrupted due to the undulating nature of the topography. Homesteads Witstinkhoutboom 1, 3, 4 and 5 lie towards the east and all show potential visibility, while Hollaagte 1 and 2 are situated towards the south east, with no potential visibility shown, most likely due to the nature of the topography. Moreover, residence of homestead Welverdiend 1, situated towards the north west within this zone will also experience potential visibility. Also, towards the north west of the PV3 Facility within this zone lies more than half of the Rall Broers Private Nature Reserve property- with potential visibility evident in patches within its southern tips of its boundary, also due to the nature of the

topography / koppies (hills) within the reserve. Other sensitive visual receptors are observers travelling along the Manana secondary road (south and south east of the site), where sporadic visibility is more evident towards the eastern end, but is more visually screened within the southern portion from the PV3 Facility within this zone.

> 6km

At distances exceeding 6km the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (development) and the observer. Sensitive visual receptors are not likely to be visually exposed to the proposed facility, despite lying within the viewshed.

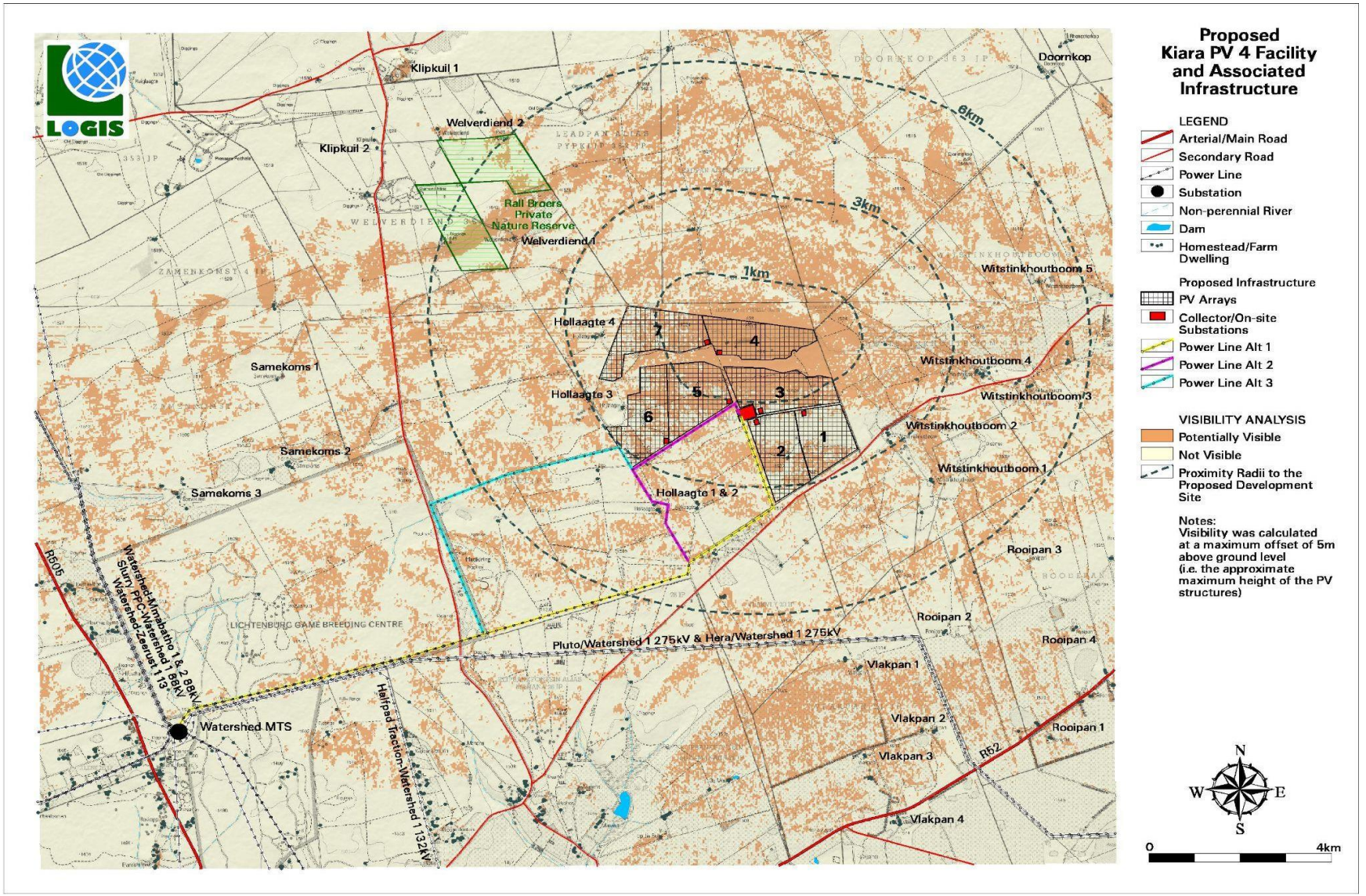


Figure 8.6 Viewshed analysis of the proposed Kiara PV3 Facility

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

Planning and Construction Phase Impacts

Nature of Impact: Visual impact of construction activities on users of the secondary road and homesteads in close proximity to the proposed PV facility.		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Short term **(2)**	Short term **(2)**
Magnitude	High **(8)**	Low **(4)**
Probability	Very Improbable **(1)**	Very Improbable **(1)**
Significance	Low **(14)**	Moderate **(10)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

» Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint.

Construction:

» Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible.
» Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
» Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
» Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
» Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.
» Rehabilitate all disturbed areas (if present/if required) immediately after the completion of construction works.

Residual impacts:

None, provided rehabilitation works are carried out as specified.

Operational Impacts

Nature of Impact: Visual impact on observers travelling along the secondary road and homesteads within a 1km radius of the PV facility structures		
	Without mitigation	***With mitigation***
Extent	Short distance **(4)**	Short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Very high **(10)**	High **(8)**
Probability	Very improbable **(1)**	Very improbable **(1)**
Significance	Low **(18)**	Moderate **(16)**

Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

» Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible.
» Consult adjacent landowners (if present) in order to inform them of the development and to identify any (valid) visual impact concerns.
» Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.

Operations:

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

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use.
» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

Residual impacts:

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

Nature of Impact:

Visual impact on observers travelling along the secondary road and residents of homesteads within a 1 – 3km radius of the PV facility structures

	Without mitigation	***With mitigation***
Extent	Short distance **(3)**	Short distance **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(45)**	Low **(26)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, however best practice measures are recommended.	

Mitigation / Management:

Planning:

» Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint.

Operations:

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

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use.
» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

Residual impacts:

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

Nature of Impact: Visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed PV facility.		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Very High **(10)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(54)**	Low **(28)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: <u>Planning & operation</u>: » Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). » Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. » Make use of minimum lumen or wattage in fixtures. » Make use of down-lighters, or shielded fixtures. » Make use of Low-Pressure Sodium lighting or other types of low impact lighting. » Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.		
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

Nature of Impact: The visual impact of solar glint and glare as a visual distraction and possible road travel hazard		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	N.A.
Duration	Long term **(4)**	N.A.
Magnitude	High **(8)**	N.A.
Probability	Very improbable **(1)**	N.A.
Significance	Low **(16)**	N.A.
Status (positive or negative)	Negative	N.A.
Reversibility	Reversible **(1)**	N.A.
Irreplaceable loss of resources?	No	N.A.
Can impacts be mitigated?	N.A.	
Mitigation: N.A.		
Residual impacts: N.A.		

Nature of Impact: The visual impact of solar glint and glare on residents of homesteads in closer proximity to the PV facility

	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Very high **(10)**	Very high **(10)**
Probability	Very Improbable **(1)**	Very improbable **(1)**
Significance	Low **(18)**	Low **(18)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

Planning & operation:

» Use anti-reflective panels and dull polishing on structures, where possible and industry standard.
» Adjust tilt angles of the panels if glint and glare issues become evident, where possible.
» If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site, where possible.

Residual impacts:

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

Nature of Impact:

Visual impact of the ancillary infrastructure during the operation phase on observers in close proximity to the structures.

	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(24)**	Low **(24)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures:

Planning:

» Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint/power line servitude where possible.

Operations:

» Maintain the general appearance of the infrastructure.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use.
» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

Residual impacts:

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

Nature of Impact: Visual impact of Kiara PV3 on visitors to the Rall Broers Private Nature Reserve.		
	Without mitigation	***With mitigation***
Extent	Medium to long distance **(2)**	Medium to Long distance **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(36)**	Low **(20)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures:

Planning:

» Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint/power line servitude where possible.

Operations:

» Maintain the general appearance of the infrastructure.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use.
» Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

Residual impacts:

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

Nature of Impact: The potential impact on the sense of place of the region. Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), plays a significant role.		
	Without mitigation	***With mitigation***
Extent	Long distance **(1)**	Long distance **(1)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(18)**	Low **(18)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures: Planning: » Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint/servitude, where possible. Operations: » Maintain the general appearance of the facility as a whole. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.

8.6.3 Overall Results

The construction and operation of the proposed Kiara PV3 Facility and its associated infrastructure may have a visual impact on the study area, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility.

Overall, the significance of the visual impacts is expected to range from moderate to low as a result of the generally undeveloped character of the landscape and the remote location of the project infrastructure. There are a very limited number of potential sensitive visual receptors within a 3km radius of the proposed PV3 structures (ie. five (5) homesteads have been described), although the possibility does exist for visitors to the region to venture into closer proximity to the PV facility structures. These observers may consider visual exposure to this type of infrastructure to be intrusive.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the PV facility and associated infrastructure would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

8.7 Social Impact Assessment

Potential social impacts and the relative significance of the impacts associated with the development of the Kiara PV3 Facility are summarised below (refer to **Appendix H**).

8.7.1 Description of Impacts

Social impacts are expected to occur during both the construction and operation phases of the associated infrastructure. The status of the impacts will either be positive or negative and either mitigation or enhancement measures are recommended for the management of the impacts depending on the status of the impacts.

Construction Phase

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

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

» Direct and indirect employment opportunities
» Economic multiplier effects
» Safety and security impacts
» Impacts on daily living and movement patterns
» Nuisance impacts, including noise and dust

1.1.4 8.7.2 Impact tables summarising the significance of social impacts during construction, operation and decommission (with and without mitigation measures)

Construction Phase Impacts

Nature: **Direct and indirect employment opportunities and skills development**			
Impact description: The creation of employment opportunities and skills development opportunities during the construction phase for the country and local economy			
	Rating	**Motivation**	**Significance**
Prior to Enhancement			
Duration	Short-term (1)	The construction period will last for less than one year	**Medium Positive (30)**
Extent	Local – Regional (5)	The impact will occur at a local, regional and national level	
Magnitude	Low (4)	The creation of employment opportunities will assist to an extent in alleviating unemployment levels within the area	
Probability	Probable (3)	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	

Enhancement measures: To enhance the local employment, skills development and business opportunities associated with the construction phase, the following measures should be implemented: » It is recommended that a local employment policy be adopted to maximise the opportunities made available to the local labour force. Voltalia South Africa (Pty) Ltd should make it a requirement for contractors to implement a 'locals first' policy, especially for semi and low skilled job categories. » Enhance employment opportunities for the immediate local area, i.e., Ditsobotla Local Municipality. If this is not possible, then the broader focus areas should be considered for sourcing workers. » Consideration must be given to women during the recruitment process. » It is recommended that realistic local recruitment targets be set for the construction phase. » Training and skills development programmes should be initiated prior to the commencement of the construction phase.			
Post Enhancement			
Duration	Short-term (1)	The construction period will last for less than one year	**Medium Positive (55)**
Extent	Regional (4)	The impact will occur at a local, regional and national level	
Magnitude	Moderate(6)	The creation of employment opportunities will assist to an extent in alleviating unemployment levels within the area	
Probability	Definite (5)	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 the skills development of communities in the area	
Residual Risks: Improved pool of skills and experience in the local area			

Nature: **Multiplier effects on the local economy**			
Impact description: Significance of the impact from the economic multiplier effects from the use of local goods and services			
	Rating	**Motivation**	**Significance**
Prior to Enhancement			
Duration	Long-term (4)	Will continue for the duration of the project due to legal obligation to pay taxes.	**Medium Positive (36)**
Extent	Local – Regional (4)	Will include mostly local and some regional impacts	
Magnitude	Low (4)	Will derive from increased cash flow from wages, local procurement, economic growth, taxes and LED and HRD initiatives.	
Probability	Probable (3)	Will depend on; proportion of local spending by employees, capacity of local enterprises to supply; effectiveness of LED and HRD initiatives, contributions to local government.	

Enhancement measures: » It is recommended that a local procurement policy be adopted by the developer to maximise the benefit to the local economy, where feasible (Ditsobotla Local Municipality). » Voltalia South Africa (Pty) Ltd should develop a database of local companies, specifically Historically Disadvantaged (HD) companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work where applicable. » It is a requirement to source as much good and services as possible from the local area. » Engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers, where feasible.			
Post Enhancement			
Duration	Long-term (4)	As for pre-enhancement	**Medium Positive (60)**
Extent	Local – Regional (4)	SMME capacity building will limit procurement from outside the local municipality	
Magnitude	Low (4)	Mitigation will likely increase intensity of multiplier effects as it will concentrate impact to local area, sustainability of initiatives will also be increased if aligned with other those of other institutions	
Probability	Definite (5)	Increased local employment and procurement as well as skilled SMME's skill enhance likelihood of benefits to local economy	
Residual Risks: Improved local service sector, growth in local business.			

Nature: **Safety and security**			
Impact description: Temporary increase in safety and security concerns associated with the influx of people during the construction phase			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Short-term (2)	Will be limited to the construction phase which is less than one year.	**Medium Negative (27)**
Extent	Local – Regional (3)	Safety concerns will affect nearby communities.	
Magnitude	Low (4)	Could place the lives of neighbouring community members at risk.	
Probability	Probable (3)	Traffic would need to be considered in the area	

Mitigation:

- Access in and out of the construction area should be strictly controlled by a security company.
- The appointed EPC contractor must appoint a security company and appropriate security procedures are to be implemented to limit access to the site and surrounding areas.
- The contractor must ensure that open fires on the site for heating, smoking or cooking are not allowed except in designated areas.
- The contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.
- Have clear rules and regulations for access to the proposed site to control loitering.
- A comprehensive employee induction programme would cover land access protocols, fire management and road safety must be prepared. A Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process

Post Mitigation			
Duration	Short-term (2)	As for pre-mitigation	**Low Negative (16)**
Extent	Local (2)	Safety measures will likely restrict impacts on nearby communities	
Magnitude	Low (4)	Appropriate mitigation will reduce the risk of this project	
Probability	Improbable (2)	As for pre-mitigation	

Residual Risks:
None anticipated.

Nature:
Disruption of daily living and movement patterns

Impact description: Temporary increase in traffic disruptions and movement patterns during the construction phase

	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Short-term (2)	Will be limited to the construction phase which is less than one year	**Medium Negative (40)**
Extent	Local (2)	Will affect road users from nearby communities	
Magnitude	Moderate (6)	Will affect the quality of life of neighboring communities	
Probability	Highly probable (4)	Traffic would need to be considered in the area	

Mitigation:

- All vehicles must be road-worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.
- Heavy vehicles should be inspected regularly to ensure their road safety worthiness.
- Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules.
- Avoid heavy vehicle activity during 'peak' hours (when people are driving to and from work).
- The developer and engineering, procurement and construction (EPC) contractors must ensure that any damage / wear and tear caused by construction related traffic to the roads is repaired.
- A comprehensive employee induction programme which covers land access protocols and road safety must be prepared.

» A Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.			
Post Mitigation			
Duration	Short-term (2)	As for pre-mitigation	**Low Negative (16)**
Extent	Local (2)	Safety measures will likely restrict impacts on road users	
Magnitude	Low (4)	Appropriate mitigation will reduce the risk of this project	
Probability	Improbable (2)	As for pre-mitigation	
Residual Risks: None anticipated.			

Nature: **Nuisance impacts (noise and dust)**			
Impact description: Nuisance impacts in terms of temporary increase in noise and dust, and the wear and tear on private farm roads for access to the site			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Short-term (2)	Nuisance impacts will only be limited to the construction phase.	**Medium Negative (44)**
Extent	Local (1)	This will remain within the project extent from construction activities.	
Magnitude	High (8)	Dust impacts and noise nuisance from construction activities.	
Probability	Highly Probable (4)	Movement of heavy construction vehicles during the construction phase has a potential to create noise, damage to roads and dust.	
Mitigation: » The movement of construction vehicles on the site should be confined to agreed access road/s. » The movement of heavy vehicles associated with the construction phase should be timed (where possible) to avoid times days of the week, such as weekends, when the volume of traffic travelling along the access roads may be higher. » Dust suppression measures should be implemented, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. » All vehicles must be roadworthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. » A Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process			

Post Mitigation			
Duration	Short-term (2)	As for pre-mitigation	**Low Negative (18)**
Extent	Local (1)	Mitigation measures will assist with increasing the impact.	
Magnitude	Moderate (6)	Appropriate mitigation will reduce the risk of this project	
Probability	Improbable (2)	As for pre-mitigation	
Residual Risks: None anticipated			

Operation Phase Impacts

It is anticipated that the Kiara PV3 Facility will operate for approximately 20 years (which is equivalent to the operational lifespan of the project). The potential positive and negative social impacts that could arise as a result of the operation of the proposed project include the following:

- Direct and indirect employment opportunities
- Development of renewable energy infrastructure
- Socio-economic benefits associated with community trust and SED investments
- Visual impact and sense of place impacts
- Impacts associated with the loss of agricultural land

Nature: **Job creation during operation**			
Impact description: The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy			
	Rating	**Motivation**	**Significance**
Prior to Enhancement			
Duration	Long term (4)	Project will be operational up to20 years	**Medium Positive (33)**
Extent	Regional (3)	Any new positions are likely to be filled by persons living in the local municipal area	
Magnitude	Low (4)	It is anticipated that ~10 jobs will be created during the operation phase. A number of highly skilled personnel may need to be recruited from outside the local municipal area	
Probability	Probable (3)	Employment opportunities will be created during the operation phase	
Enhancement measures: » It is recommended that a local employment policy is adopted by the developer to maximise the project opportunities being made available to the local community. Enhance employment opportunities for the immediate local area, Ditsobotla Local Municipality, if this is not possible, then the broader focus areas should be considered for sourcing employees. » The recruitment selection process should seek to promote gender equality and the employment of women wherever possible » The developer should establish vocational training programs for the local employees to promote the development of skills			
Post Enhancement			
Duration	Long-term (4)	As for pre-enhancement	**Medium Positive (44)**

Extent	Local - regional (3)	As for pre-enhancement	
Magnitude	Low (4)	Mitigation will maximise local job creation	
Probability	High Probable (4)	Mitigation will maximise probability that any local recruitment targets are achieved, and local benefits optimised	
Residual Risks: Improved pool of skills and experience in the local area			

Nature: **Development of clean, renewable energy infrastructure**			
Impact description: Development of clean, renewable energy infrastructure			
	Rating	**Motivation**	**Significance**
Prior to Enhancement			
Duration	Long term (4)	Adding a renewable energy sector to the Lichtenburg economy may contribute to the diversification of the local economy and provide greater economic stability.	**Medium Positive (48)**
Extent	Local – Regional - National (4)	The generation of renewable energy will contribute to South Africa's electricity market. Since the off taker of the power generated by the facility will be Sasol limited (which is currently dependent on Eskom for electricity supply), the proposed development will indirectly relieve the national grid	
Magnitude	Low (4)	The proposed facility will only generate up to 120MW	
Probability	Highly Probable (4)	Facility will help contribute to the total carbon emissions associated with non-renewable energy generation	
Enhancement measures: None anticipated			
Post Enhancement			
Duration	Long term (4)	As for pre-enhancement	**Medium Positive (48)**
Extent	National (4)	As for pre-enhancement	
Magnitude	Low (4)	As for pre-enhancement	
Probability	Highly Probable (4)	As for pre-enhancement	
Residual Risks: Reduce carbon emissions through the use of renewable energy and contribute to reducing global warming			

Nature: **Socio-economic benefits associated with community trust and SED investments**			
Impact description: Development of clean, renewable energy infrastructure			
	Rating	**Motivation**	**Significance**
Prior to Enhancement			
Duration	Long term (4)	Adding a renewable energy sector to the Ditsobotla economy may contribute to the	**Medium Positive (50)**

		diversification of the local economy and provide greater economic stability.	
Extent	Local – Regional - National (4)	The generation of renewable energy will contribute to South Africa's electricity market, and the proposed development will indirectly relieve the national grid	
Magnitude	Moderate (6)	The proposed facility will only generate up to 120MW	
Probability	Highly Probable (4)	Facility will help contribute to the total carbon emissions associated with non-renewable energy generation	
Enhancement measures: None anticipated			
Post Enhancement			
Duration	Long term (4)	As for pre-enhancement	**Medium Positive (64)**
Extent	National (4)	As for pre-enhancement	
Magnitude	High (8)	As for pre-enhancement	
Probability	Highly Probable (4)	As for pre-enhancement	
Residual Risks: Social upliftment of the local communities through the development and operation of the project.			

Nature: **Visual impacts and impacts on sense of place**			
Impact description: Visual impacts and sense of place impacts associated with the operation phase of the project			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Long term (4)	Impact on sense of place relates to the change in the landscape character and visual impact of the proposed solar energy facility	**Medium Negative (48)**
Extent	Very short distance (4)	Dependent on the demographics of the population that resides in the area and their perceptions	
Magnitude	High (8)	There are industrial/mining operations and formal residential areas located in proximity to the site	
Probability	Probable (3)	There are no tourist attractions located adjacent to the property and therefore the anticipated impact on the area's visual quality and sense of place is low.	
Mitigation: None anticipated			
Post Mitigation			
Duration	N.A. – Mitigation not possible.		**N.A. – Mitigation not possible.**
Extent	N.A. – Mitigation not possible.		
Magnitude	N.A. – Mitigation not possible.		
Probability	N.A. – Mitigation not possible.		
Residual Risks:			

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

Nature: **Impacts associated with the loss of agricultural land**			
Impact description: Development on agricultural land and removal of potential agricultural production			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Long term (4)	The development footprint on which the solar energy facility will be developed will be removed from agricultural production	**Medium Negative (33)**
Extent	Local (1)	The impact will occur at local level	
Magnitude	Moderate (6)	Impacts associated with the loss of agricultural land use to occupation of land by the solar energy facility.	
Probability	Probable (3)	Land uses will be affected by development	
Mitigation Measures			
Mitigation: » Keep the project footprint as small as possible.			
Post Mitigation/Enhancement Measures			
Duration	Long term (4)	As for pre-mitigation	**Low Negative (27)**
Extent	Local (1)	As for pre-mitigation	
Magnitude	Low (4)	As for pre-mitigation	
Probability	Probable (3)	As for pre-mitigation	
Residual Impact: The implications in terms of food production and security could also threaten jobs of workers employed in the agricultural activities.			

Decommissioning Phase Impacts

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 programme. With mitigation, the impacts are assessed to be Low (negative).

8.7.3 Overall Result

From a social perspective, it is concluded that the project is supported, but that mitigation measures should be implemented and adhered to. Positive and negative social impacts have been identified. The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws, and which are of such significance that they cannot be successfully mitigated. Positive impacts could be enhanced by implementing appropriate enhancement measures and through careful planning. Based on the social assessment, the following general conclusions and findings can be made:

- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focused on the construction of PV facilities and pivot infrastructure (these relate to intrusion and disturbance impacts, safety and security) and could be reduced with the implementation of the mitigation measures proposed.
- Employment opportunities will be created in the construction and operation phases and the impact is rated as positive even if only a small number of individuals will benefit in this regard.
- The proposed project could assist the local economy in creating entrepreneurial development, especially if local businesses could be involved in the provision of general material and services during the construction and operational phases.
- Capacity building and skills training amongst employees are critical and would be highly beneficial to those involved, especially if they receive portable skills to enable them to also find work elsewhere and in other sectors.
- The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society.

The following recommendations are made based on the Social Impact Assessment which included a stakeholder engagement process. The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts. Based on the social assessment, the following recommendations are made:

- In terms of employment related impacts, it is important to consider that job opportunities for the unskilled and semi-skilled are scarce commodities in the study area and could create competition among the local unemployed. Introducing an outside workforce will therefore most likely worsen local endeavours to obtain jobs and provoke discontent as well as put pressure on the local services available. Local labour should be utilised to enhance the positive impact of employment creation in the area. Local businesses should be involved with the construction activities where possible. It is imperative that local labour be sourced to ensure that benefits accrue to the local communities. Preference should thus be given to the use of local labour during the construction and operational phases of the project as far as possible.
- Locals should also be allowed an opportunity to be included in a list of possible local suppliers and service providers, enhancing the multiplier effect. This aspect would serve to mitigate other subsequent negative impacts such as those associated with the inflow of outsiders to the area, the increased pressure on the infrastructure and services in the area, as well as the safety and security concerns.
- Impacts associated with the construction period should be carefully mitigated to minimise any dust and noise pollution.
- Safety and security concerns should be considered during the planning and construction phases of the proposed project.

The proposed project and associated infrastructure will create a number of potential socio-economic opportunities and benefits and is unlikely to result in permanent damaging social impacts. From the specialist's perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that the project can be authorised from a social perspective.

8.8 Risks Associated with Battery Energy Storage System

A Battery Energy Storage Systems (BESS) comprising a solid-state battery system will allow for energy storage for an extended period. The general purpose and utilisation of the BESS will be to save and store excess electrical output from the facility as it is generated, allowing for a timed release to the national grid when the capacity is required. The BESS will be contained within insulated containers and will connect to the on-site facility substation via underground cabling. **Figure 9.10** provides a general illustration of a BESS.

Figure 8.7 Example of battery storage units integrated as part of wind farm (Source: http://ultrabattery.com/applications/stationary-energy-storage/)

The risks associated with battery technologies are generally well understood and researched. The primary risks relate to fire hazards and the potential for a condition known as 'thermal runaway'. Thermal runaway occurs in situations where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result. The risks detailed in the table below considers only the risks associated with on-site use of battery energy storage systems.

Possible risks associated with the construction and operation of the BESS from a technical perspective within the development footprint of Kiara PV3 Facility are limited to health and safety aspects during the project life cycle of the BESS. The risks identified for the construction and operation of the BESS are detailed below. Mitigation measures have been included within the project EMPr (refer to **Appendix K**).

Table 8.3 Risks associated with Battery Energy Storage Systems

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
1. <u>Mechanical breakdown/ Exposure to high temperatures</u> » Incidents where the batteries are broken or exposed to temperature above room temperature could lead to overheating as well as fires which can affect infrastructure components of the BESS. » Leakages of substances contained within the battery cells (should they not be assembled off-site).	Low	» Fires, electrocutions and spillage of toxic substances into the surrounding environment. » Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. » Water pollution – spillages into surrounding watercourses as well as groundwater. » Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.	Operators are trained and competent to operate the BESS. Training should include the discussion of the following: * Potential impact of electrolyte spills on groundwater; * Suitable disposal of waste and effluent; * Key measures in the EMPr relevant to worker's activities; * How incidents and suggestions for improvement can be reported. » Training records should be kept on file and be made available during audits. » Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. » Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. » Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). » Firefighting equipment should readily be available at the BESS area and within the site. » Maintain strict access control to the BESS area. » Ensure all maintenance contractors / staff are familiar with the supplier's specifications. » Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these. » Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. » Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment.

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
			» The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed. » Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. » The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS. » Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS.
2. <u>Generation of hazardous waste</u> » The incorrect disposal of the batteries and the associated components could have an adverse impact on the environment.	Medium	» Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from the disposed batteries into the soil, which could lead to an impact of the productivity of soil forms in affected areas. » Water pollution – leachate from the disposed batteries spilling into surrounding watercourses as well as groundwater. » Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.	» Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. » The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.

8.9 Assessment of the Do Nothing Alternative

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

a) Land use and agriculture

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which predominantly covers "Low" to "Moderate" sensitivities. may be favourably considered. However, it is not envisaged that the number of agricultural employment opportunities generated by the agricultural activities within the project site would exceed the number of skilled, semi-skilled and unskilled employment opportunities that would be created by the construction and operation of Kiara PV3 Facility (400 temporary jobs during construction and 33 permanent jobs during operation). The development of the solar energy facility would therefore result in a significant gain in employment numbers for the area in which the project site is located, albeit only for the construction phase, especially since the gain in employment numbers will not be accompanied by any losses in agricultural employment as a result of the proposed development.

In addition, the directly affected landowners would obtain an income from the solar facility (as the developer would pay a percentage of the revenue generated to the landowner in accordance with the lease agreement for the use of the land). This would contribute towards the financial stability of the landowners which would in turn contribute to the financial viability of the farming practices on the property. The implementation of the 'do nothing' alternative would retain the current land-use, fore-going the opportunity to generate renewable energy from the sun and at the same time continue the current agricultural activities on areas that fall outside of the solar energy facility footprint.

The 'do nothing' alternative would result in a lost opportunity for the landowners (in terms of implementing a compatible land use option, while still retaining the current land use, as well as a loss in long-term revenue) and the country (in terms of renewable energy). From this perspective the no-go alternative is not preferred when considering land use and agricultural aspects of the project site. Use of the identified site for the development of the proposed solar energy facility is considered to be a preferred land use as the benefits will outweigh the impacts.

From a visual perspective, however, the implementation of the 'do-nothing' alternative will conserve the landscape as it currently is. Transformation will lead to a change in the sense of place for the area; however, no fatal flaws have been identified in this regard.

b) Socio-economic impact

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

- The benefits would be that there is no disruption from an influx of jobseekers into the area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- There would however be an opportunity lost in terms of job creation, skills development and associated economic business opportunities for the local economy, as well as a loss of the opportunity to generate energy from a renewable resource without creating detrimental effects on the environment.

New Business: Some of the positive spin off effects that are to ensue from the project expenditure will be localised in the communities located near the site, such as the towns of Musina and Mopane. The local services sector and specifically the trade, transportation, catering and accommodation, renting services, personal services and business services are expected to benefit the most from the project activities during the construction phase. New business sales that will be stimulated as a result of the establishment of the

solar farm, albeit for a temporary period, will be lost with the implementation of the 'do nothing' alternative. Therefore, from a business perspective, the 'do-nothing' alternative is not preferred as there is a loss of new business opportunities.

Employment: The development of Kiara PV3 Facility within the Ditsobotla Local Municipality will aid in a reduction of the unemployment rate, however if the solar farm is not developed then the unemployment rate will not be positively influenced by the proposed development. The upliftment and socio-economic benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative. Therefore, from an employment perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of employment opportunities.

Skills development: The establishment of Kiara PV3 Facility will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various renewable energy facilities are proposed to be developed in the area and in the North West Province, which means that the transfer of skills from foreign experts to the local engineers and construction workers will take place, similar to what has taken place where other renewable energy facilities have been constructed and operated within the Province. The skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

Municipal goals: The opportunity to contribute to the innovative energy sourcing methods as identified by the Musina Local Municipality as per a draft policy which sets out the criteria which will enable the evaluation of renewable energy generation infrastructure to be developed in a manner that will limit the potential negative impacts thereof will not be met should Kiara PV3 Facility not be constructed with the implementation of the 'do nothing' alternative.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited. The area has experienced social challenges which has resulted in the need for socio-economic upliftment. The SIA concluded that there would be greater social benefits associated with the project than the 'do nothing' alternative.

Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred due to the loss of socio-economic benefits associated with the project when considering the current socio-economic conditions of the area.

c) Impact on electricity supply and targets regarding renewable energy

At a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. Although Kiara PV3 Facility is only proposed to contribute a contracted capacity of up to 120MW to the grid capacity, this would assist in meeting the electricity demand for the relevant private off-takers and would also assist in meeting the government's goal for renewable energy and the energy mix. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

» Increased energy security;
» Resource saving (i.e. fossil fuels and water);

- Exploitation of South Africa's significant renewable energy resource;
- Pollution reduction;
- Climate friendly development;
- Support for international agreements;
- Employment creation;
- Acceptability to society; and
- Support to a new industry sector.

At present, South Africa is some way off from fully exploiting the diverse gains from renewable energy and from achieving a considerable market share in the renewable energy industry. South Africa's electricity supply remains heavily dominated by coal-based power generation, with the country's significant renewable energy potential largely untapped to date.

The Integrated Resource Plan (IRP) (2019) provides for the development of 6 000MW of capacity from large scale solar energy facilities by 2030. The IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies.

8.10 Conclusion

The no-go is the continuation of the existing land use, i.e. maintain the status quo. As detailed in the sections above, there would be no environmental impacts on the site or to the surrounding local area due to the construction and operation activities of a solar farm with the implementation of this alternative. All negative impacts, specifically related to the development of the solar farm, discussed in this report will not materialise.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government. However, as the project site experiences ample solar resource and optimal grid connection opportunities, not developing Kiara PV3 Facility would see such an opportunity being lost. In addition, the North West Province will not benefit from additional generated power being evacuated directly into the Province's grid. As current land use activities can continue on the site once the project is operational, the loss of the land to this project during the operation phase (less than 1% of the larger project site) is not considered significant. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with Kiara PV3 Facility subject to implementation of the recommended mitigation measures. All impacts associated with the project can be mitigated to acceptable levels. If the solar energy facility is not developed, the following positive impacts will not be realised:

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

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

CHAPTER 9: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 9, a solar PV facility development may have effects (positive and negative) on natural resources, the social environment and on the people living in a project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with the Kiara PV3 Facility largely in isolation (from other similar developments).

This chapter assesses the potential for the impacts associated with the project to become more significant when considered in combination with the other operating or proposed solar PV facility projects within the area.

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

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

Requirement	Relevant Section
3(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.	The cumulative impacts associated with the development of the Kiara PV3 Facility are included and assessed within this chapter.

9.2 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the solar facility and its associated infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to confirm if such impacts are relevant to the Kiara PV3 Facility within the project site being considered for the development. This assessment considers whether the cumulative impact will result in:

- Unacceptable loss of threatened or protected vegetation types, habitat, or species through clearing, resulting in an impact on the conservation status of such flora, fauna, or ecological functioning.
- Unacceptable risk to avifauna through habitat loss, displacement, and collision with solar panels.
- Unacceptable loss of agricultural potential areas presenting a risk to food security and increased soil erosion.
- Unacceptable loss of heritage resources (including palaeontological and archaeological resources).
- Complete or whole-scale change in the sense of place and character of an area and unacceptable visual intrusion.
- Unacceptable negative impact to socio-economic factors and components.

Further to the above, positive cumulative impacts are also expected and will be associated with socio-economic aspects and benefits.

Figure 9.1 indicates the location of the Kiara PV3 Facility in relation to all other known operating and proposed renewable energy facilities located within the surrounding area of the project site. These projects were identified using the DFFE Renewable Energy Database and current knowledge of projects operating

and being proposed in the area. For the assessment of cumulative impacts, only developments within a 30km radius from the Kiara PV3 Facility were considered (**Table 9.1** and **Figure 9.1**), which is in line with the DFFE requirements.

Table 9.1: Renewable energy facilities located within the broader area (within a 30km radius) of the Kiara PV3 Facility project site

Project Name	Project Status
Barleria PV Facility	In process
Setaria PV Facility	In process
Dicoma PV Facility	In process
Hibernia PV Facility	Authorised
Orion 1 & 2 PV Facility	Authorised
Lichtenburg 1 PV Facility	Authorised
Lichtenburg 2 PV Facility	Authorised and under construction
Lichtenburg 3 PV Facility	Authorised and under construction

In addition to the solar energy developments listed above, six new PV solar energy facilities are proposed for development on the same and adjacent property as part of the Kiara cluster, as indicated in **Table 9.2**.

Table 9.2: Six New PV facilities proposed for development on the same and adjacent properties

Project Name	Affected property	Contracted Capacity
Kiara PV1	Portion 2 of the Farm Hollaagte No. 8	120MW
Kiara PV2	Portion 2 of the Farm Hollaagte No. 8	120MW
Kiara PV3	Portion 2 of the Farm Hollaagte No. 8	120MW
Kiara PV5	Remaining Extent of the Farm Hollaagte No. 8	130MW
Kiara PV6	Portion 2 of the Farm Hollaagte No. 8	130MW
Kiara PV7	Remaining Extent of the Farm Hollaagte No. 8	130MW

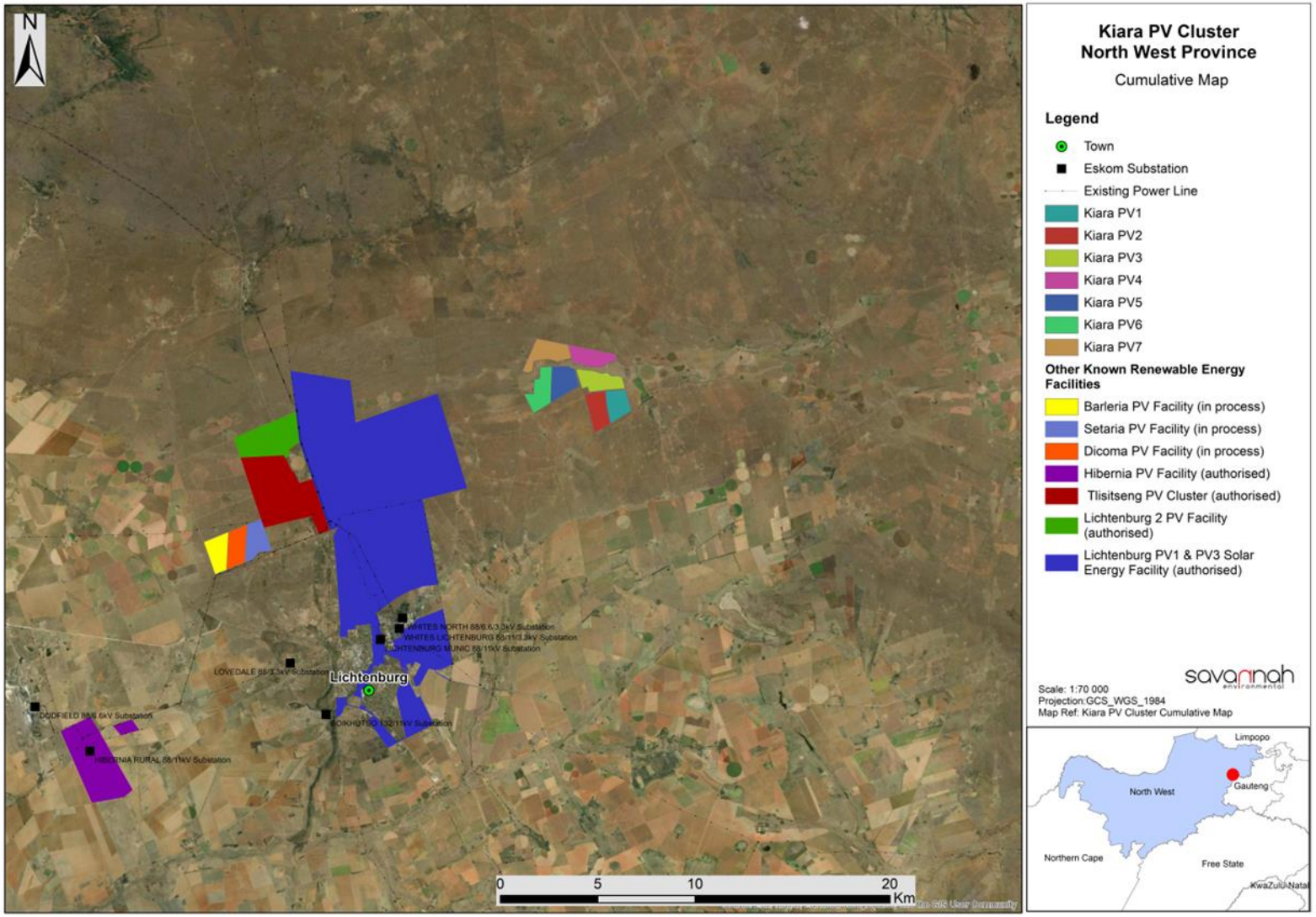


Figure 9.1: Cumulative map illustrating other known approved and/or constructed renewable energy facilities located within a 30km radius of the Kiara PV3 Facility

9.3 Cumulative Impacts on Ecology

The surrounding areas are largely still natural and the area is therefore not affected to a large extent by cumulative transformation pressures at present. However, it is well known that the area has been increasingly subjected to applications for solar energy developments and the cumulative impact that this transformation will have will steadily increase over time. The proposed development will also entail an extensive total extent of approximately 1600 hectares and though each development phase does not cover a large area, cumulatively the development will have a high impact. This will also be taken into account for the current proposed development which will therefore contribute toward a significant cumulative impact.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Moderate (3)	Moderate (4)
Duration	Medium-term (5)	Medium - term (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Highly probable (4)
Significance	**High (70)**	**High (60)**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes – but limited	Yes – but limited
Confidence in findings: High		
Mitigation: » The cumulative impact is unlikely to be easily mitigated. Decreasing the total development footprint should allow for a decrease in the cumulative impact. It is however anticipated to remain significant.		

9.4 Cumulative Impacts on Avifauna

The overall cumulative impacts accounts for the relative importance of the habitats within and adjacent to the project area, in the context of the value of the regional habitat. Approximately 43.5% of the habitat has already been lost, and the proposed solar developments will result in a cumulative loss of approximately 22.14% from only similar developments (Solar, approved and in process) in the area for the remaining habitat. As such the cumulative impact from the proposed development is rated as "high", with overall medium significance. The overall cumulative (total) habitat loss within the 30 km buffer amounts to 56%. This means that the careful spatial management and planning of the entire region must be a priority, and existing large infrastructure projects must be carefully monitored over the long term.

Nature: Cumulative habitat loss within the region **The development of the proposed infrastructure will contribute to cumulative habitat loss and thereby impact the ecological processes in the region.**		
	Project in Isolation	**Cumulative Impacts**
Extent	High (2)	Regional (4)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Definite (5)
Significance	**Medium**	**High**
Status (positive or negative)	Negative	Negative
Reversibility	None	None

Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	
Mitigation: Even though collisions can be mitigated to some extent for individual solar facilities their combined densities will increase the rate of collisions. Monitoring of the implementation of mitigation measures for each project proposed needs to be done to ensure the cumulative impact does not become high.		
Residual Impacts: The cumulative impacts are rated as high based on the loss of habitat for key avifauna species found in the region. Residual impacts include loss of habitat for endemic and SCC as well as loss of SCC due to collisions.		

9.5 Cumulative Impacts on Soil and Agricultural Potential

***Nature*:** Decrease in areas with suitable land capability for cattle farming.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Short duration - 2-5 years (2)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly likely (4)	Highly likely (4)
Significance	**Low (28)**	**Medium (40)**
Status (positive/negative)	Negative	Negative
Reversibility	High	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
***Mitigation*:** The only mitigation measure for this impact is to keep the footprints of all renewable energy facilities as small as possible and to manage the soil quality by avoiding far-reaching soil degradation such as erosion.		

***Nature*:** Increase in areas susceptible to soil erosion		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Medium (33)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Mitigation: Each of the projects should adhere to the highest standards for soil erosion prevention and management, as defined in Chapter 8 of the EIA Report, and as relevant for all proposed projects in the area.		

***Nature*:** Increase in areas susceptible to soil erosion

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Low (27)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
***Mitigation*:** Each of the projects should adhere to the highest standards for soil compaction prevention and management, as defined in Chapter 8 of the EIA Report, and as relevant for all proposed projects in the area.		

***Nature*:** Increase in areas susceptible to soil pollution		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (30)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
***Mitigation*:** Each of the projects should adhere to the highest standards for soil pollution prevention and management, as defined in Chapter 8 of the EIA Report, and as relevant for all proposed projects in the area.		

9.6 Cumulative Impacts on Heritage resources (including archaeology and palaeontology)

The proposed development is located within a belt of approved renewable energy facilities. In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The proposed development is therefore unlikely to result in unacceptable risk or loss, nor will the proposed development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact.

Nature: Cumulative Impact to the sense of place due to the development of the PV facility which will intensify industrial development within the area.		
	Project in Isolation	**Cumulative Impacts**
Extent	Low (1)	Low (1)
Duration	Medium - term (3)	Long-term (4)
Magnitude	Low (4)	Low (1)

Probability	Improbable (2)	Probable (5)
Significance	**Low (16)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	None	None
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	
Mitigation: No impacts are anticipated and as such, no mitigation is required		
Residual Impacts: The cumulative impacts are rated as high based on the loss of habitat for key avifauna species found in the region. Residual impacts include loss of habitat for endemic and SCC as well as loss of SCC due to collisions.		

9.7 Cumulative Visual Impacts

The construction of the Kiara PV3 Facility may increase the cumulative visual impact of industrial type infrastructure within the region, especially in relation to the other six (6) solar energy facilities that form part of the Kiara PV Cluster and its associated infrastructure, as well as other approved renewable energy projects (namely Lichtenburg 1 Solar PV and an Unknown (incorrectly specified) project falling within the homestead areas of Vlakpan 1,2,3 and 4).

The cumulative visual impact is expected to be of moderate significance due to their remote locations and limited potential sensitive visual receptors.

Nature of Impact: The potential cumulative visual impact of the PV facility on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation (with mitigation)	***Cumulative impact of the project and other projects within the area (with mitigation)***
Extent	Very short distance **(4)**	Short distance **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Moderate **(42)**	Moderate **(39)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures: Planning: » Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint where possible. Operations: » Maintain the general appearance of the facility as a whole. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.

9.8 Cumulative Social Impacts

The potential for cumulative impacts to occur as a result of the projects is likely. Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as on pressure on local services and change in visual impacts.

Nature: **An increase in employment opportunities, skills development and business opportunities with the establishment of more than one solar energy facility**		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local -regional (3)	Local-regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Medium (52)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: The establishment of a number of solar energy facilities in the area does have the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities. The positive benefits will be enhanced if local employment policies are adopted and local services providers are utilised by the developers to maximise the project opportunities available to the local community.		

Nature: **Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area**		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local-regional (3)
Duration	Long-term (4)	Long-term (4)

Magnitude	Low (4)	Low (4)
Probability	Very improbable (3)	Improbable (2)
Significance	**Medium (27)**	**Low (22)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Mitigation: » Develop a recruitment policy / process (to be implemented by contractors), which will ensure the sourcing of labour locally, where available. » Work together with government agencies to ensure that service provision is in line with the development needs of the local area. » Form joint ventures with community organisations, through Trusts, which can provide local communities with benefits, such as employment opportunities and services. » Develop and implement a recruitment protocol in consultation with the municipality and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.		

Nature: **Visual impact on sense of place and landscape character**		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local-regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	No, only best practice measures can be implemented	
Confidence in findings: High.		
Mitigation: » Maintain and manage the facilities to be in a good and neat condition to ensure that no degradation of the area and sites takes place and impacts the visual quality of the area. » Implement the relevant mitigation measures as recommended in the Visual Impact Assessment		

9.9 Conclusion regarding Cumulative Impacts

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

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

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes, aquatic systems) due to the development of Kiara PV3 Facility and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of Kiara PV3 Facility and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.
- Change to the sense of place and character of the area is expected with the development of the proposed Kiara PV3 Facility and other renewable energy facilities within a 30km radius of the site. The cumulative impact is however considered to be acceptable provided best practice management measures are implemented.
- There will be no unacceptable loss of heritage resources associated with the development of Kiara PV3 Facility. The cumulative impact is therefore acceptable.
- No unacceptable negative social impacts are expected to occur. Positive cumulative impacts are expected to occur from a social perspective as a result of local economic upliftment and employment opportunities. Positive cumulative impacts are expected to be beneficial at a regional level. The cumulative impact is therefore acceptable.

The cumulative impacts associated with Kiara PV3 Facility will be of a low and medium significance. A summary of the cumulative impacts is included in **Table 9.3** below.

Table 9.3: Summary of the cumulative impact significance for Kiara PV3 Facility

Specialist Assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Ecology	High	High
Avifauna	Medium	High
Soil, Land use, and agricultural potential	Low	Medium
Heritage (including archaeology, palaeontology and sense of place)	Low	Low
Socio-Economic	Positive impacts: Low Negative impacts: Medium or Low (depending on the impact being considered)	Positive impacts: Medium Negative impacts: Medium or Low (depending on the impact being considered)
Visual	Medium	Medium

Based on the specialist cumulative assessment and findings, the development of the Kiara PV3 Facility and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that the Kiara PV3 Facility cumulative impacts will be mainly of a medium to low significance, with impacts of a high significance mainly relating to terrestrial biodiversity impacts. Therefore, the development of the Kiara PV3 Facility will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

CHAPTER 10: CONCLUSIONS

Voltalia South Africa (Pty) Ltd, is proposing the development of a commercial photovoltaic (PV) solar energy facility and associated infrastructure on a site located approximately 16km north-east of the town of Lichtenburg, within the Ditsobotla Local Municipality and the Ngaka Modiri Molema District Municipality in the North West Province. The project is to be known as the Kiara PV3 Facility and is planned as part of a larger cluster of renewable energy projects, which include six (6) additional PV facilities, (known as the Kiara PV1, Kiara PV2, Kiara PV3, Kiara PV5, Kiara PV6 and Kiara PV7) and grid connection infrastructure connecting the facilities to the existing Watershed Substation. These projects are proposed by separate Specialist Purpose Vehicles (SPVs) and are assessed through separate Environmental Impact Assessment (EIA) processes.

The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 120MW. A project site consisting of within Portion 2 of the Farm Hollaagte No. 8 and the Remaining Extent of the Farm Hollaagte No. 8(~856.5ha in extent) is being considered for the Kiara PV3 facility. The full extent of the project site was evaluated in the Scoping Phase to identify sensitivities and a facility layout has been provided and assessed within this EIA process. A dedicated development area for the solar PV facility (~195ha in extent) has been demarcated to avoid the identified environmental sensitivities and has been assessed in this EIA Report and associated specialist studies.
From a regional perspective, the North West Province, and particularly the area under investigation, is considered favourable for the development of a commercial solar facility by virtue of prevailing climatic conditions, relief, the extent of the affected properties, the availability of a direct grid connection (i.e., a point of connection of the national grid) and the availability of land on which the development can take place.

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

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

Requirement	Relevant Section
3(1)(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report.	A summary of the findings of the specialist studies undertaken for the Project has been included in section 10.2.
3(1)(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	An environmental impact statement containing the key findings of the environmental impacts of the Project has been included as section 10.9. An Environmental Sensitivity and Layout map of the Project has been included as **Figure 10.1** which overlays the development footprint (as assessed within the EIA) of the Kiara PV3 Facility with the environmental sensitive features located within the Development Area.

Requirement	Relevant Section
	A summary of the positive and negative impacts associated with the Project has been included in section 10.2.
3(1)(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation of the Project has been included in section 9.10.
3(1)(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	A reasoned opinion as to whether the Project should be authorised has been included in section 10.10

10.2 Evaluation of the Kiara PV3 Facility

The preceding chapters of this report together with the specialist studies contained within **Appendices D-I** provide a detailed assessment of the potential impacts that may result from the development of the Project. This chapter concludes the environmental assessment of the Project by providing a summary of the results and conclusions of the assessment the Development Footprint for the Kiara PV3 Facility. In so doing, it draws on the information gathered as part of the EIA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the Project.

No environmental fatal flaws or unacceptable impacts were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the development area as specified by the specialists.

The potential environmental impacts associated with the Project assessed through the EIA process include:

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

The environmental sensitivities identified by the relevant specialists for the Project Site are illustrated in **Figure 10.1** The Development Footprint, as assessed, has been overlain with the relevant environmental sensitivities.

10.2.1 Impacts on Ecology

The majority of the project site still consists of natural grassland which is still in a fairly good condition. Some disturbance is present though in general these are localised or has been able to re-establish a near natural grass layer. The surrounding areas are also largely still natural, and the area is therefore not affected to a large extent by cumulative transformation pressures. However, it is well known that the larger area has been increasingly subjected to applications for solar energy developments and the cumulative impact that this transformation will have will steadily increase over time.

The description of the proposed development area indicates a relatively uniform habitat, with moderate species diversity and largely without any unique habitats or areas of high diversity. Furthermore, the vegetation consists of Carletonville Dolomite Grassland, which although it has a significant species diversity, is currently listed as being of Least Concern (LC) which also does not contribute toward its conservation value. Overall, the vegetation in the study area can therefore not be regarded as exceeding a Moderate level of sensitivity. Areas of localised high conservation value may however still be present, and which may require exclusion from development. The proposed development of Kiara PV3 of the development contains a few such rocky areas containing a notably higher species diversity with less common and protected plant also being present. Kiara PV3 is also located adjacent to the lower lying drainage area which is considered to have a high conservation value.

A few rocky areas occurring in Kiara PV3 of the development and is notably higher in terms of species diversity and protected plant species. These areas also contain uncommon, protected species with a higher conservation value. Such species included the uncommon succulent, Euphorbia davyi and protected succulent, Orbea lutea subsp. lutea. Owing to the higher diversity of some of these rocky areas as well as the presence of plant species which are protected and less common, a few of these areas have been designated as having a high level of sensitivity. Furthermore, the Marico Biosphere Reserve also border the study area to the north.

10.2.2 Impact on Avifauna

The assessment area consists of four avifauna habitats; transformed areas, degraded grassland, grassland and bushclumps. These habitats were still mostly in a natural state with the exception of some areas that have been disturbed by livestock grazing and transformed due to anthropogenic activities. Two SCC were confirmed in the assessment area and surrounds Cape Vulture (Gyps coprotheres) and Greater Flamingo (Phoenicopterus roseus) (which is likely to fly over the assessment area). There is a possibility that additional conservation important and sensitive vulture species occur within the project area. Some high-risk avifauna species were recorded from the project area and surrounds, including both raptors and water birds.

The project will result in habitat loss and degradation of avifaunal habitats. The development will lead to the clearing of vegetation and an altering in the undeveloped nature of the area. Based on the medium receptor resilience and the medium functional integrity, the assessment area was given a medium to low site ecological importance with transformed areas having a very low site ecological importance (SEI).

The development will also lead to sensory disturbance, collision and electrocution risks. Even though the latter three impacts can be effectively mitigated, the loss of habitat cannot be mitigated. Considering the number of applications and current solar plant developments in the area the cumulative impact is regarded as being high.

Mitigation measures that have provided have resulted in the reduction of most impacts to a Moderate or Low, which is considered within the limits of acceptable change. It is the opinion of the specialist that the project may be considered for approval, but all prescribed mitigation measures and monitoring must be considered by the issuing authority. Any power lines that may be developed must be extensively mitigated due to the presence of a vulture restaurant in the vicinity.

10.2.3 Impacts on Land Use, Soils and Agricultural Potential

The largest part of the total area assessed, has Low agricultural potential (159ha). Low agricultural potential has been assigned to soils of the Mispah and Glenrosa forms because of the shallow soil depth. Moderate agricultural potential is allocated to the Hutton soil form due to its deep soil depth and was found in the north-western part of the study area (6ha). The low agricultural potential of the soils within the development area is confirmed by the absence of crop field boundaries within the Kiara PV 3 development area.

It is anticipated that the construction and operation of the Kiara PV3 Facility will have impacts that range from medium to low. Through the consistent implementation of the recommendation mitigation measures, most of impacts can all be reduced to low. It is my professional opinion that this application be considered favourably, permitting that the mitigation measures are followed to prevent soil erosion and soil pollution and to minimise impacts on the veld quality of the farm portions that will be affected. The project infrastructure should also remain within the proposed development area that will be fenced off.

10.2.4 Impacts on Heritage Resources (incl. archaeology and palaeontology)

Archaeology

No stone age archaeological resources were identified during the field assessment despite the presence of abundant raw material sources. In other nearby projects, Stone Age archaeological resources that were identified were graded as having low levels of scientific significance. As such, it is very unlikely that the proposed development will impact on significant Stone Age archaeological heritage.

A number of stone structures were identified within the study area. These have been categorised as either kraals or ruins of varying heritage value. Where the kraals and ruins form part of a cluster of resources, these have been graded as IIIC for their historical contextual significance and their contribution to the cultural landscape. It is recommended that a no-development buffer of 20m is implemented around these Grade IIIC structures. Where ruins or kraals are isolated on the landscape, their heritage value is limited and as such, these have been graded as Not Conservation-Worthy (NCW).

A number of graves were identified within the areas proposed for development. All the graves are ascribed high local levels of cultural value and as such, are graded IIIA. It is important that human remains are not disturbed through the process of construction of this development.

The clusters of resources have been mapped with their recommended no-go buffer areas in the maps above. In order to conserve the integrity of the relationship between the kraals, ruins and graves, it is recommended that the clusters as mapped are considered to be no-go areas for the proposed development.

Palaeontology

Geological units within the development area range from very highly sensitive dolomites of the Monte Christo Formation of the Malmani Subgroup to moderately sensitive, recent, alluvium.

Following observations during the field investigation as well as data obtained from previous palaeontological impact assessments in this region, it is our professional opinion that significant stromatolites from the Malmani Subgroup are abundantly present in this area.

The excavations for the construction of the proposed Kiara PV3 Facility will most probably expose some sediments that are very highly sensitive geological formations and some sites revealed evidence of very highly significant remains of fossils. A significant part of the excavation project will cut into rocks of the Malmani Subgroup, Chuniespoort Group of the Transvaal Supergroup. This unit has a very high sensitivity for palaeontological heritage. Impacts to the sensitive geology can be mitigated through the implementation of the attached Chance Fossil Finds Procedure for the duration of construction activities

10.2.5 Visual Impacts

The construction and operation of the proposed Kiara PV3 Facility and its associated infrastructure may have a visual impact on the study area, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility.

Overall, the significance of the visual impacts is expected to range from moderate to low as a result of the generally undeveloped character of the landscape and the remote location of the project infrastructure. There are a very limited number of potential sensitive visual receptors within a 3km radius of the proposed PV3 structures (ie. five (5) homesteads have been described), although the possibility does exist for visitors to the region to venture into closer proximity to the PV facility structures. These observers may consider visual exposure to this type of infrastructure to be intrusive.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the PV facility and associated infrastructure would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

10.2.6 Impact on the Social Environment

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

From a social perspective, it is concluded that the project is supported, but that mitigation measures should be implemented and adhered to. Positive and negative social impacts have been identified. The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws, and which are of such significance that they cannot be successfully mitigated. Positive impacts could be enhanced by implementing appropriate enhancement measures and through careful planning. Based on the social assessment, the following general conclusions and findings can be made:

» The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focused on the construction of PV facilities and pivot infrastructure (these relate to intrusion and disturbance impacts, safety and security) and could be reduced with the implementation of the mitigation measures proposed.

» Employment opportunities will be created in the construction and operation phases and the impact is rated as positive even if only a small number of individuals will benefit in this regard.
» The proposed project could assist the local economy in creating entrepreneurial development, especially if local businesses could be involved in the provision of general material and services during the construction and operational phases.
» Capacity building and skills training amongst employees are critical and would be highly beneficial to those involved, especially if they receive portable skills to enable them to also find work elsewhere and in other sectors.
» The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society.

The following recommendations are made based on the Social Impact Assessment which included a stakeholder engagement process. The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts. Based on the social assessment, the following recommendations are made:

» In terms of employment related impacts, it is important to consider that job opportunities for the unskilled and semi-skilled are scarce commodities in the study area and could create competition among the local unemployed. Introducing an outside workforce will therefore most likely worsen local endeavours to obtain jobs and provoke discontent as well as put pressure on the local services available. Local labour should be utilised to enhance the positive impact of employment creation in the area. Local businesses should be involved with the construction activities where possible. It is imperative that local labour be sourced to ensure that benefits accrue to the local communities. Preference should thus be given to the use of local labour during the construction and operational phases of the project as far as possible.
» Locals should also be allowed an opportunity to be included in a list of possible local suppliers and service providers, enhancing the multiplier effect. This aspect would serve to mitigate other subsequent negative impacts such as those associated with the inflow of outsiders to the area, the increased pressure on the infrastructure and services in the area, as well as the safety and security concerns.
» Impacts associated with the construction period should be carefully mitigated to minimise any dust and noise pollution.
» Safety and security concerns should be considered during the planning and construction phases of the proposed project.

The proposed project and associated infrastructure will create a number of potential socio-economic opportunities and benefits and is unlikely to result in permanent damaging social impacts. From the specialist's perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that the project can be authorised from a social perspective.

10.2.7 Assessment of Cumulative Impacts

Cumulative impacts are expected to occur with the development of the Kiara PV3 Facility throughout all phases of the project life cycle and within all areas of study considered as part of this EIA report. The main aim for the assessment of cumulative impacts considering the Kiara PV3 Facility is to test and determine

whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

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

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes, aquatic systems) due to the development of Kiara PV3 Facility and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of Kiara PV3 Facility and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.
- Change to the sense of place and character of the area is expected with the development of the proposed Kiara PV3 Facility and other renewable energy facilities within a 30km radius of the site. The cumulative impact is however considered to be acceptable provided best practice management measures are implemented.
- There will be no unacceptable loss of heritage resources associated with the development of Kiara PV3 Facility. The cumulative impact is therefore acceptable.
- No unacceptable negative social impacts are expected to occur. Positive cumulative impacts are expected to occur from a social perspective as a result of local economic upliftment and employment opportunities. Positive cumulative impacts are expected to be beneficial at a regional level. The cumulative impact is therefore acceptable.

Based on the specialist cumulative assessment and findings, the development of the Kiara PV3 Facility and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that the Kiara PV3 Facility cumulative impacts will be mainly of a medium to low significance, with impacts of a high significance mainly relating to terrestrial biodiversity impacts. Therefore, the development of the Kiara PV3 Facility will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

10.2.8 Assessment of 'Do nothing' Alternative

The no-go is the continuation of the existing land use, i.e. maintain the status quo. There would be no environmental impacts on the site or to the surrounding local area due to the construction and operation activities of a solar farm with the implementation of this alternative. All negative impacts, specifically related to the development of the solar farm, discussed in this report will not materialise.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government. However, as the project site experiences ample solar resource and optimal grid connection opportunities, not developing Kiara PV3 Facility would see such an opportunity being lost. In addition, the Limpopo Province will not benefit from additional generated power being evacuated directly into the Province's grid. As current land use activities can continue on the site once the project is operational, the loss of the land to this project during the operation phase (less than 1% of the larger project site) is not considered significant.

Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with Kiara PV3 Facility subject to implementation of the recommended mitigation measures. All impacts associated with the project can be mitigated to acceptable levels. If the solar energy facility is not developed, the following positive impacts will not be realised:

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

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

10.2.7 Assessments of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

The site for the proposed development (Portion 2 of the Farm Hollaagte No. 8 is located within 30km from several other authorised solar PV facilities. These projects include the following:

Project Name	Distance from the proposed site	Project Status
Barleria PV Facility	28 km south-west	In process
Setaria PV Facility	22 km south-west	In process
Dicoma PV Facility	25 km south-west	In process
Hibernia PV Facility	30 km north-west	Authorised
Tlisitseng PV Facility	16 km south-west	Authorised
Lichtenburg 2 PV Facility	15 km west	Authorised
Lichtenburg 1 PV Facility	7 km west	Authorised
Lichtenburg 3 PV Facility	7 km west	Authorised

In addition to the solar energy developments listed below, six new PV solar energy facilities are proposed for development on the same and adjacent property namely:

Project Name	Affected property	Contracted Capacity
Kiara PV2	Portion 2 of the Farm Hollaagte No. 8	120MW

Kiara PV3	Portion 2 of the Farm Hollaagte No. 8	120MW
Kiara PV3	Portion 2 of the Farm Hollaagte No. 8	120MW
Kiara PV5	Remaining Extent of the Farm Hollaagte No. 8	130MW
Kiara PV6	Portion 2 of the Farm Hollaagte No. 8	130MW
Kiara PV7	Remaining Extent of the Farm Hollaagte No. 8	130MW

All cumulative impacts associated with the Project are expected to be of a medium or low significance. A summary of the cumulative impacts is included in **Table 10.1** below.

Table10.1: Summary of the cumulative impact significance for the Kiara PV3 Facility

Specialist Assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Ecology	High	High
Avifauna	Medium	High
Soil, Land use, and agricultural potential	Low	Medium
Heritage (including archaeology, palaeontology and sense of place)	Low	Low
Socio-Economic	Positive impacts: Low Negative impacts: Medium or Low (depending on the impact being considered)	Positive impacts: Medium Negative impacts: Medium or Low (depending on the impact being considered)
Visual	Medium	Medium

Based on the specialist cumulative assessment and findings, the development of the Project and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that the contribution of the project to cumulative impacts will be of a medium to low significance. Therefore, it was concluded that the development of the Project will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

10.3 Assessment of the Facility Layout

Taking into consideration the solar resource, proximity to the off-taker and point of interconnection, 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 Project within the Development Footprint is considered to be desirable. The Development Footprint within which the facility is proposed is sufficient in extent for the installation of a solar PV facility of up to 120MW, while allowing for the avoidance of environmental site sensitivities.

The indicative facility layout/development footprint assessed within this EIA Report (**Figure 10.1**) was designed by the project developer in order to respond to and avoid the sensitive environmental and social features located within the project site, which were identified by the specialists during the Scoping Phase of the EIA process. This approach ensured the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate, and offset) to the proposed project, which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the project site.

Although the proposed layout overlaps with some areas of sensitivity, the specialists have concluded that the project as proposed can be authorised on condition that the recommended mitigation measures are implemented. As such, the impact of this proposed Facility Layout is considered to be acceptable and the layout is recommended for approval. Final micro-siting must however be undertaken prior to construction considering all mitigation measures recommended within this EIA Report and associated specialist studies.

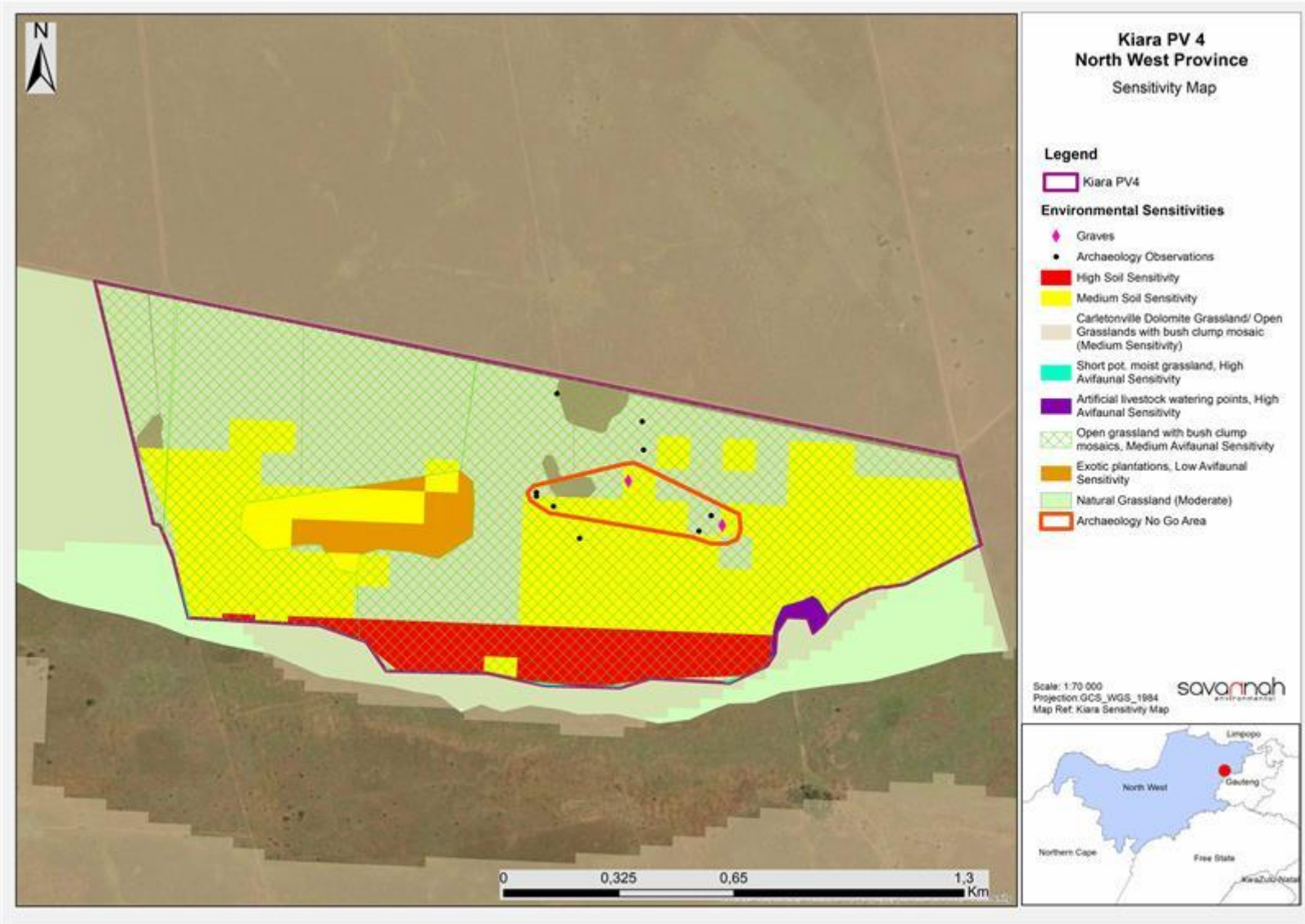


Figure 10:1 Sensitivity map of the Kiara PV3 Facility (Drainage line has been excluded from the development footprint)

10.4 Environmental Costs versus Benefits of the Project

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

- *Loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for the Kiara PV3 Facility*. The cost of loss of biodiversity has been minimised/avoided through the limited placement of project components and infrastructure within the ecological features, and areas considered to be of high sensitivity.
- *Impacts on aquatic resources*. The Project will not result in any direct impacts on water resources and as a result has a low residual impact on aquatic ecology.
- *Impact on avifauna due to loss of bird species due to collision with infrastructure and disturbance associated with construction and operation of the facility*. Mitigation measures as described in this report can be implemented to reduce the significance of the risk but there is still a possibility of impacts.
- *Loss of land for agriculture*. The development will remove areas available for agricultural activities. However, based on the small development footprint of the solar facility and the fact that agricultural potential of the site is low to moderate, this will be limited and not significant.
- *Visual impacts associated with the solar facility/impacts to the sense of place*. Kiara PV3 Facility will be visible to receptors up to a distance of 3km from the site and mainly of a high significance. No mitigation of this impact is possible (i.e., the structures will be visible in the landscape), but general mitigation and management are required as best practise to minimise secondary visual impacts which may arise from mismanagement of the site.
- *Impacts on heritage resources*. based on the outcomes of the Heritage Impact Assessment, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that the recommended buffers are implemented.

Benefits of the Kiara PV3 Facility include the following:

- The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development. These will persist during the pre-construction, construction, operation and decommissioning phases of the Project.
- The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development. These will persist during the pre-construction, construction, operation and decommissioning phases of the project.
- The project provides an opportunity for a new land use on the affected properties which would result in additional financial benefits to the directly affected landowners through compensation. It is important to note that the construction and operation of a solar facility can occur in tandem with agricultural activities on the remaining portions.
- The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy, in line with national policy regarding energy generation.
- The water requirement for a solar facility is negligible compared to the levels of water used by coal-based technologies. This generation technology is therefore supported in dry climatic areas.

» South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. Kiara PV3 Facility will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of the project are expected to occur at a national, regional, and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure in the development area within medium and low sensitive areas, and through the avoidance of features and areas considered to be of high and very high sensitivity, the benefits of the project are expected to partially offset the localised environmental costs of the Project.

10.5 Overall Conclusion (Impact Statement)

A technically viable Development Footprint for the Kiara PV3 Facility was proposed Voltalia South Africa (Pty) Ltd and assessed as part of the EIA process. The environmental assessment of the Project was undertaken by independent specialists and their findings have informed the results of this EIA Report. Voltalia South Africa (Pty) Ltd has proposed a technically viable layout for the project, which has been assessed as part of the independent specialist studies. This layout was developed considering identified environmental sensitivities with the main purpose to avoid impacts on these. This is in line with tier 2 of the mitigation hierarchy.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the Project is seen from a policy perspective at a local, provincial and National level.

The specialists considered desktop data, results from field work, existing literature and the National Web-based Environmental Screening Tool to inform the identification of sensitivities. The specialist findings have concluded that there are no identified environmental fatal flaws associated with the implementation of the Kiara PV3 Facility. The impacts that are expected to remain after the avoidance of the sensitive areas have been reduced through the recommendation of specific mitigation measures by the specialists. The minimisation of the significance of the impacts is in line with tier 2 of the mitigation hierarchy. Therefore, it is concluded that impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. In addition, it was concluded that the development of the Kiara PV3 facility will not result in unacceptable, high cumulative impacts and will not result in a whole-scale change of the environment.

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

It can be concluded that the development of the Kiara PV3 Facility will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

10.6 Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the Development Footprint proposed by the Project Developer, the avoidance of the sensitive environmental features within the Development Footprint, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the Project is acceptable within the landscape and can reasonably be authorised subject to avoidance of the sensitive areas identified through the EIA process and the implementation of recommended mitigation measures. The following project details should be included within the EA for the Project:

» The Kiara PV3 Facility will have a contracted capacity of up to 120MW and will be located on Portion 2 of the Farm Hollaagte No. 8 and the Remaining Extent of the Farm Hollaagte No. 8.

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

» PV modules and mounting structures
» Inverters and transformers
» Cabling between the panels.
» Cabling from the onsite substation to the collector substation (either underground or overhead).
» 132kV onsite facility substation.
» Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
» Battery Energy Storage System (BESS)
» Site and internal access roads (up to 8m wide)
» Site offices and maintenance buildings, including workshop areas for maintenance and storage.
» Temporary and permanent laydown area
» Grid connection solution will include:
    - Facility Substation
    - Eskom Switching Station
    - A 275kV powerline (16.6km in length) (either single or double circuit), to connect the PV facility to the Watershed MTS

The following key conditions would be required to be included within an authorisation issued for the Project:

» All mitigation measures detailed within this EIA Report, as well as the specialist reports contained within **Appendices D to I** are to be implemented.
» The EMPrs as contained within **Appendix L** and **M** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the Kiara PV3 Facility and associated infrastructure in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the project is considered key in achieving the appropriate environmental management standards as detailed for this Project.
» Chance Fossil Finds Procedure must be implemented for the duration of the construction phase of the project.
» Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

- Obtain the necessary permits for specimens or protected plant species that will be lost due to construction of the project.
- As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores.
- A site walk through must be undertaken by a suitably qualified ecologist prior to any construction activities, preferably during the wet season and any SSC should be noted.
- All other relevant permits should be obtained prior to construction of the proposed facility.

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from the Department of Forestry, Fisheries and the Environment.

CHAPTER 11: REFERENCES

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Heritage

Heritage Impact Assessments				
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8330	AIA Phase 1	Francois P Coetzee	01/03/2008	Cultural Heritage Survey of the PPC Slurry Operation, near Zeerust, North West Province
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8531	HIA Phase 1	Johnny Van Schalkwyk	01/11/2008	Heritage Impact Report for the Proposed 88 kV Power Line from Watershed Substation, Lichtenburg, to the Mmabatho Substation, North West Gauteng Province
50047	HIA Phase 1	M Hutten	01/05/2012	Heritage Impact Assessment for the Proposed Lichtenburg Solar Park North of Lichtenburg, North West Province
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