DICOMA PV FACILITY AND ASSOCIATED INFRASTRUCTURE NORTH WEST PROVINCE

Environmental Impact Assessment Report

DFFE Ref.: 14/12/16/3/3/2/2106

February 2022

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PROJECT DETAILS

DEFF Reference	:	**14/12/16/3/3/2/2106**
Title	:	Dicoma PV Facility and Associated Infrastructure, North West Province
Authors	:	Savannah Environmental (Pty) Ltd Rendani Rasivhetshele Jana de Jager Karen Jodas
Client	:	Dicoma PV (Pty) Ltd
Report Status	:	Environmental Impact Assessment Report for public review (from 07 February to 09 February 2022)
Date	:	February 2022

When used as a reference this report should be cited as: Savannah Environmental (2022) Environmental Impact Assessment Report for the Dicoma PV Facility and associated infrastructure, North West Province.

PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT

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

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

- **Chapter 1** provides background to the Dicoma PV facility project and the environmental impact assessment.
- **Chapter 2** provides a project description of Dicoma PV.
- **Chapter 3** outlines strategic regulatory and legal context for energy planning in South Africa and specifically relating to the project.
- **Chapter 4** describes the need for, and alternatives considered for the Dicoma PV facility.
- **Chapter 5** outlines the approach to undertaking the Scoping/EIA process.
- **Chapter 6** describes the existing biophysical and social environment within and surrounding the study and development area.
- **Chapter 7** provides an assessment of the potential impacts associated with the proposed solar PV facility and associated infrastructure.
- **Chapter 8** provides an assessment of the potential cumulative impacts associated with the proposed solar PV facility and associated infrastructure.
- **Chapter 9** presents the conclusions and recommendations for the proposed Dicoma PV facility.
- **Chapter 10** provides references used to compile the EIA report.

The EIA Report is available for review from **Monday, 7 February 2022** to **Wednesday, 9 March 2022** at (https://savannahsa.com/public-documents/energy-generation/houthaalbomen-pv-cluster/). All comments received and recorded during the 30-day review and comment period have been included, considered and addressed within the final EIA report for the consideration of the National Department of Forestry, Fisheries, and the Environment (DFFE)

Please submit your comments by **Wednesday, 9 March 2022** to:

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

EXECUTIVE SUMMARY

Dicoma PV (Pty) Ltd is proposing the construction of a photovoltaic (PV) solar energy facility (known as Dicoma PV) located on a site approximately 5km north-west of the town of Lichtenburg in the North West Province. The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 75MW. The facility will be located within the farm Portion 1, Portion 9, Portion 10 of the Farm Houthaalboomen 31 (refer to **Figure 1**). The project site falls under the Ditsobotla Local Municipality which is part of Ngaka Modiri Molema District Municipality. The site is accessible via an existing gravel road (provincial road D2435) which tees-off from the R505 regional road.

A development area of 179ha has been identified within the broader project site by the proponent for the development of Dicoma PV and associated infrastructure, which has been fully considered within this Scoping/EIA process, and assessed in terms of its suitability from an environmental and social perspective within this EIA Report.

The project will comprise the following key infrastructure and components:

- » PV modules and mounting structures
- » Inverters and transformers
- » BESS, Construction and O&M hub, including:
- Battery Energy Storage System (BESS)
- Temporary and permanent laydown area
- Site offices and maintenance buildings, including workshop areas for maintenance and storage
- » Site and internal access roads (up to 8m wide)
- » Grid connection solution within a 100m wide corridor, including:
- 33kV cabling between the project components and the facility substation
- A 132kV facility substation
- A 132kV Eskom switching station
- A Loop-in-Loop out (LILO) overhead 132kV power line between the Eskom switching station and the existing Delareyville Munic–Watershed 1 88kV power line[1].

Two alternative grid connection configurations have been considered for the proposed project and include:

Grid Connection Alternative 1: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other approximately 2.2km east of the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV[2] . The grid connection infrastructure is located within an assessment corridor 100m in width.

[1] The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

[2] The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

Grid Connection Alternative 2: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other approximately 991m east of eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV. The grid connection infrastructure is located within an assessment corridor of 100m in width.

The associated infrastructure consisting of the BESS, Laydown Area, and Ancillary building, is located within development area that has been assessed during the scoping and EIA phase. The placement for the associated infrastructure will however be dependent on the grid connection alternative selected for authorisation.

A comparative assessment of the alternatives for the project is undertaken as part of the impact assessment in order to identify the preferred alternatives from an environmental perspective.

No environmental fatal flaws were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of no-go features (i.e. 10m heritage no-go areas) within the project development area by the development footprint and the undertaking of monitoring, as specified by the specialists.

The potential environmental impacts associated with Dicoma PV facility identified and assessed through the EIA process include:

- Impacts on ecology, flora and fauna.
- Impacts on avifauna.
- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area imposed by the components of the facility.
- Social impacts.

Impacts on Ecology (including flora and fauna)

The Terrestrial Ecology Assessment (Appendix D) undertaken determined that there are no impacts associated with the Dicoma PV facility and associated grid line corridor that cannot be mitigated to an acceptable level and as such, the assessed layout was considered acceptable. It was found that the bulk of project site will be located within a slightly degraded to near-natural savanna grassland type characterized by *Searsia pyroides.* Furthermore, about a quarter of the project site is located within a secondary grassland. To the north and north-east the vegetation comprises of a mostly natural savanna grassland type characterized by *Senegalia hereroensis*. Both of savanna/wooded grasslands are variations of the Carletonville Dolomite Grassland vegetation type which is listed as Least Threatened.

Almost the entire development footprint (gird and PV Solar) is located within an ESA1 (Corridor/Linkage). Due to the large extent of this ESA1 (90% of the development footprint), and the availability of ample natural to near natural areas still available the development will not have a significant impact on this ESA, and its ability to function as an important corridor.

Overall, there are no specific long-term impacts likely to be associated with the development of the Dicoma PV project that cannot be reduced to a low significance. Both grid connection corridor alternatives are

also considered to be acceptable. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

Impacts on Avifauna

The Avifauna Impact Assessment (Appendix E), which considered the results of two seasons of pre-construction bird monitoring, determined the significance of potential avifauna impact to be moderate to low after mitigation (depending on the type of impact), with the exception of the potential for birds to collide with the associated power lines, which was high without mitigation (and moderate after mitigation). The study site is not located near any prominent wetland system or impoundment, and therefore the risk of waterbird collisions with the proposed infrastructure was considered to be low. However, in the absence of sufficient information on the occurrence and rate of passing waterbirds, it was recommended that supporting evidence be acquired by means of peak wet season before construction (pre-construction surveys).

The endangered Cape Vulture (Gyps coprotheres) and critically endangered White-backed Vulture (Gyps africanus) (and to a lesser degree also Lappet-faced Vulture Torgos tracheliotos) were identified as regular foraging visitors to the study site (according to SABAP2 reporting rates and on-site observations). These species are highly prone to power line collisions, whereby the proposed energy facility (especially the proposed overhead power lines) could pose a collision and electrocution risk to vultures. The risk of collision/electrocution was considered likely when vultures feed on a carcass in close proximity to a power line or when attempting to roost on the pylon structures.

No fatal flaws were identified during the assessment of the PV Facility. Impacts related to avian collision and electrocution with overhead power lines between LILO alternative 1 and 2 were also considered to not be a fatal flaw regardless of the alternative route. Nevertheless, it is recommended by the specialist that the proposed mitigation measures and monitoring protocols (additional with pre- and post-construction monitoring) be implemented during the construction and operational phase of the project.

Impacts on Soil and Agricultural Potential

The soil forms present within the development area consist mostly of shallow soils underlain by lithic material or rock that has severe limitations to rainfed crop production. The current agricultural land use is livestock farming and the land has never been used for rainfed or irrigated crop production. There is also no irrigation infrastructure, such as centre pivots or drip irrigation, present within the project area. Considering the soil properties, land capability and agricultural potential of the development area, the majority of the area has Low Agricultural Sensitivity with a small extent of Medium Agricultural Sensitivity.

It is anticipated that the construction and operation of the Dicoma PV facility and associated infrastructure 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. Both grid connection corridor alternatives are also considered to be acceptable. It is therefore the specialist's opinion that the proposed development is 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 project area that will be fenced off.

Impacts on Heritage Resources (archaeological and paleontological)

A number of stone structure were identified within the development area. It is likely that this is a burial site (LICBUR1, LICBUR2, LICBUR6, LICBUR10, LI9, LI13 and LI14). These sites are graded IIIA and a no-development buffer of 10m is recommended around this site. The impact rating was determined to be of low significance with mitigation, where required. Based on the experience of the palaeontologist and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the loose sands of the Quaternary. No fossils were seen during the site survey and there were no rocky outcrops at all.

The heritage specialists have no objection to the proposed development of the Dicoma PV facility on condition that the 10m no-go buffer be implemented, a management plan is developed for the ongoing and long-term management of the burials within the development area, and a Chance Fossil Finds Procedure be implemented for the duration of the construction phase of the project. From a heritage and paleontological perspective, both grid connection alternatives are considered acceptable.

Visual Impacts

The anticipated visual impacts associated with the construction and operation phases of the Dicoma PV Facility and associated infrastructure range from moderate to low significance. These anticipated visual impacts on sensitive visual receptors, if and where present, in close proximity to the proposed facility (Scherppunt, Houthaalbomen 1 and 2 , the western residences within the Elandsfontein agricultural holdings, and observers travelling along the R503 arterial road south of the facility) are not considered to be fatal flaws.

In the specialist's opinion, considering all factors, it is recommended that the development of the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management programme. Both grid connection corridor alternatives are acceptable however Grid Connection Corridor Alternative 2 will remove the substation and switching station further away from the Elandsfontein small holdings and placing it in closer proximity to the other PV facility infrastructure.

Social Impacts

The social impacts identified (including all positive and negative impacts) will be either of a low or medium significance. No negative impacts with a high significance rating have been identified to be associated with the development of the Dicoma PV Facility and associated infrastructure. All negative social impacts are within acceptable limits with no impacts considered as unacceptable from a social perspective. The recommendations proposed for the project are appropriate and suitable for the mitigation of the negative impacts and the enhancement of the positive impacts. Dicoma PV Facility and its associated grid connection is supported at a national, provincial, and local level, and that the proposed project will contribute positively towards a number of targets and policy aims.

Based on the findings of the SIA the proposed establishment of the Dicoma PV is supported.
Traffic Impacts

The impact of the construction trip generation, on the predicted 2023 traffic volumes near the town of Lichtenburg and along the transportation routes, are expected to be low. No mitigation measures (upgrading of existing intersections) will be necessary. The direct impact and significance of the Dicoma PV Facility is considered low negative and low positive for the traffic and community parameters, respectively.

it is the reasoned opinion of the specialist that Dicoma PV Facility can be authorised from a traffic perspective.

Assessment of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa and within the surrounding areas of the development area. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional, and national level have the potential to be significant.

Based on the specialist cumulative assessment and findings (Appendix D to Appendix J and Chapter 8 of the EIA), the development of Dicoma PV and its contribution to the overall impact of all existing and proposed solar energy facilities within a 30km radius, it can be concluded that cumulative impacts will be of a low to high significance, with impacts of a high significance mainly relating to impacts on avifauna. There are however no impacts or risks identified to be considered as unacceptable with the development of Dicoma PV and other solar energy facilities within the surrounding area. In addition, no impacts which will result in whole-scale change are expected.

Comparative Assessment of Alternatives

As part of specialist assessments both alternative grid connection solutions were assessed, and both alternative corridors were determined to be acceptable from an environmental perspective. A summary of the assessment of impacts for the grid connection corridor and associated infrastructure alternatives are detailed below:

Aspect	Grid Connection Corridor Alternative 1	Grid Connection Corridor Alternative 2
Ecology	*Preferred & Acceptable*	*Acceptable*
Avifauna	*Acceptable*	*Acceptable*
Heritage	*Acceptable*	*Acceptable*
Visual	*Acceptable*	*Preferred & Acceptable*

Grid Connection Corridor Alternative 1 is preferred from an ecological perspective whereas Grid Connection Corridor Alternative 2 is the preferred alternative from a visual perspective. However, it has been indicated by the respective specialists that all impacts on both grid connection corridor alternatives can be mitigated to acceptable levels and therefore both alternatives are considered to be environmentally acceptable.

Grid Connection Corridor Alternative 1 was identified by the developer as the preferred alternative from a technical feasibility perspective, due to its strategic location allowing it to potentially act as a broader collector switching station for future planned projects. This grid alternative has been fully considered and assessed as part of the Scoping/EIA process and within this EIA report to be acceptable from an environmental perspective. Grid Connection Corridor Alternative 2 is less preferred from the technical perspective due to the location being surrounded by an adjacent PV facility to the west, north and east, and constrained by existing power lines to the south. This infrastructure will inhibit the entry of the high voltage

feeder lines into the Eskom collector switching station, which renders the alternative technically less preferred.

Overall Conclusion & Recommendations

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer within the development site, the avoidance of the sensitive environmental features within the project site, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the Dicoma PV facility is acceptable within the landscape and can reasonably be authorised. The proposed layout as provided by the Applicant (**Figure 2**) is considered to be the most appropriate from an environmental perspective as it avoids identified sensitivities and recommended buffer areas.

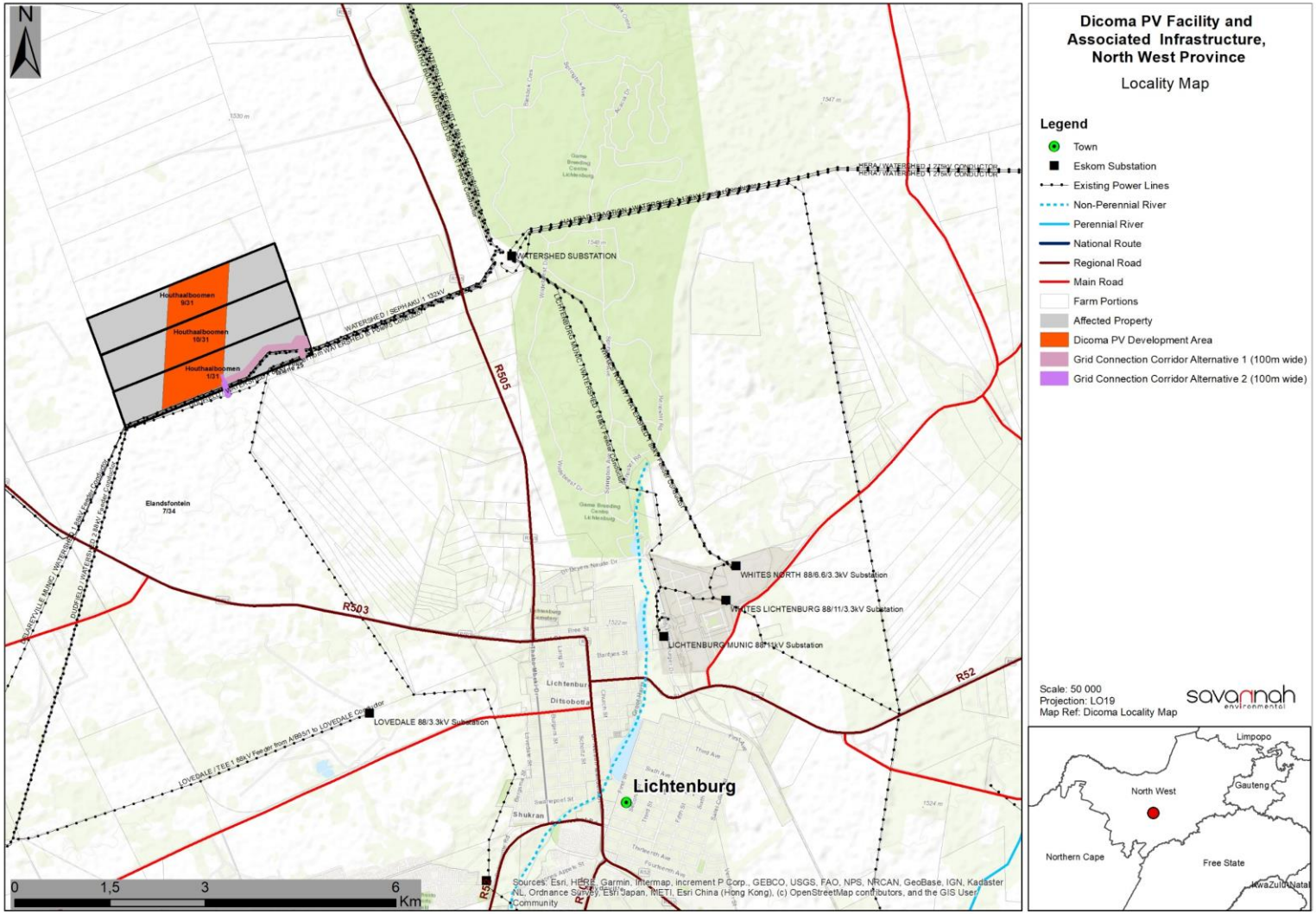

Figure 1.: Locality map illustrating the location of the Dicoma PV development area within the larger project site, including the grid connection corridor alternatives (refer to **Appendix O** for map).

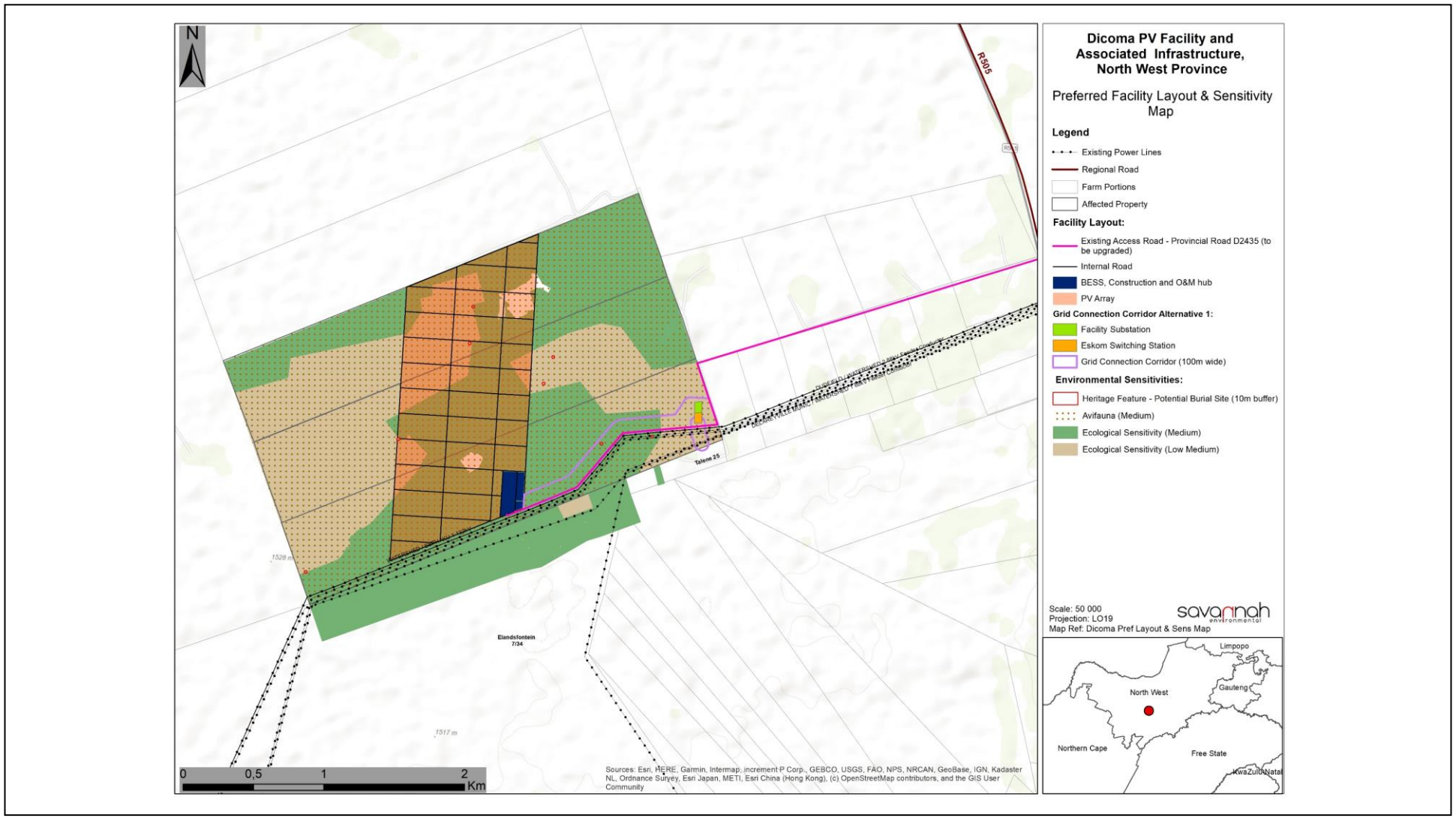

Figure 2: Preferred layout and sensitivity map of the preferred development footprint and grid connection corridor for the Dicoma PV Facility, as was assessed as part of the EIA process (A3 map is included in Appendix O

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.

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

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

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

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

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
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)
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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APPENDICES LIST

CHAPTER 1: INTRODUCTION

The Applicant, Dicoma (Pty) Ltd is proposing the construction of the Dicoma solar photovoltaic (PV) facility, planned to be located on a site located approximately 5km north-west of the town of Lichtenburg in the North West Province (refer to **Figure 1.1**). The development area falls within the jurisdiction of the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality.

The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 75MW. A project site consisting of the farms Portion 1, Portion 9, Portion 10 of the Farm Houthaalboomen 31 is being considered for the Dicoma PV facility. A development area of approximately 179ha has been identified within the project site for the construction and operation of the Dicoma PV and its associated infrastructure, and the full extent of this development area is assessed within this EIA Report. The grid connection for the facility will consist of underground cabling, a facility substation, an Eskom switching substation, and loop-in loop-out (LILO) power line connection into an existing Eskom power line to the south of the project site. The grid connection infrastructure is within a 100m wide assessment corridor located on the southern boundary the project site (on Portion 1 of the Farm Houthaalboomen 31, and also traversing Portion 0 of Farm Talene 25 and Portion 7 of Farm Elandsfontein 34). An existing gravel road along Portions 5 to 11 of the Farm Talene 25 will also be upgraded to access the facility.

Two (2) additional 75MW PV facilities (Dicoma PV and Dicoma PV) are located adjacent to the project site (within Portion 1, Portion 9, Portion 10 of the Farm Houthaalboomen 31), and will be assessed through separate Environmental Impact Assessment (EIA) processes. The relative location of the three development areas are indicated in **Figure 1.2**.

From a regional perspective, the Lichtenburg area is considered favourable for the development of a commercial solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the extent of the affected property, the availability of a grid connection (i.e. a point of connection to the national grid) and the availability of land on which the development can take place.

Dicoma PV facility is planned to be bid into the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply with Dicoma PV facility set to inject up to 75MW into the national grid at a point within the North West Province.

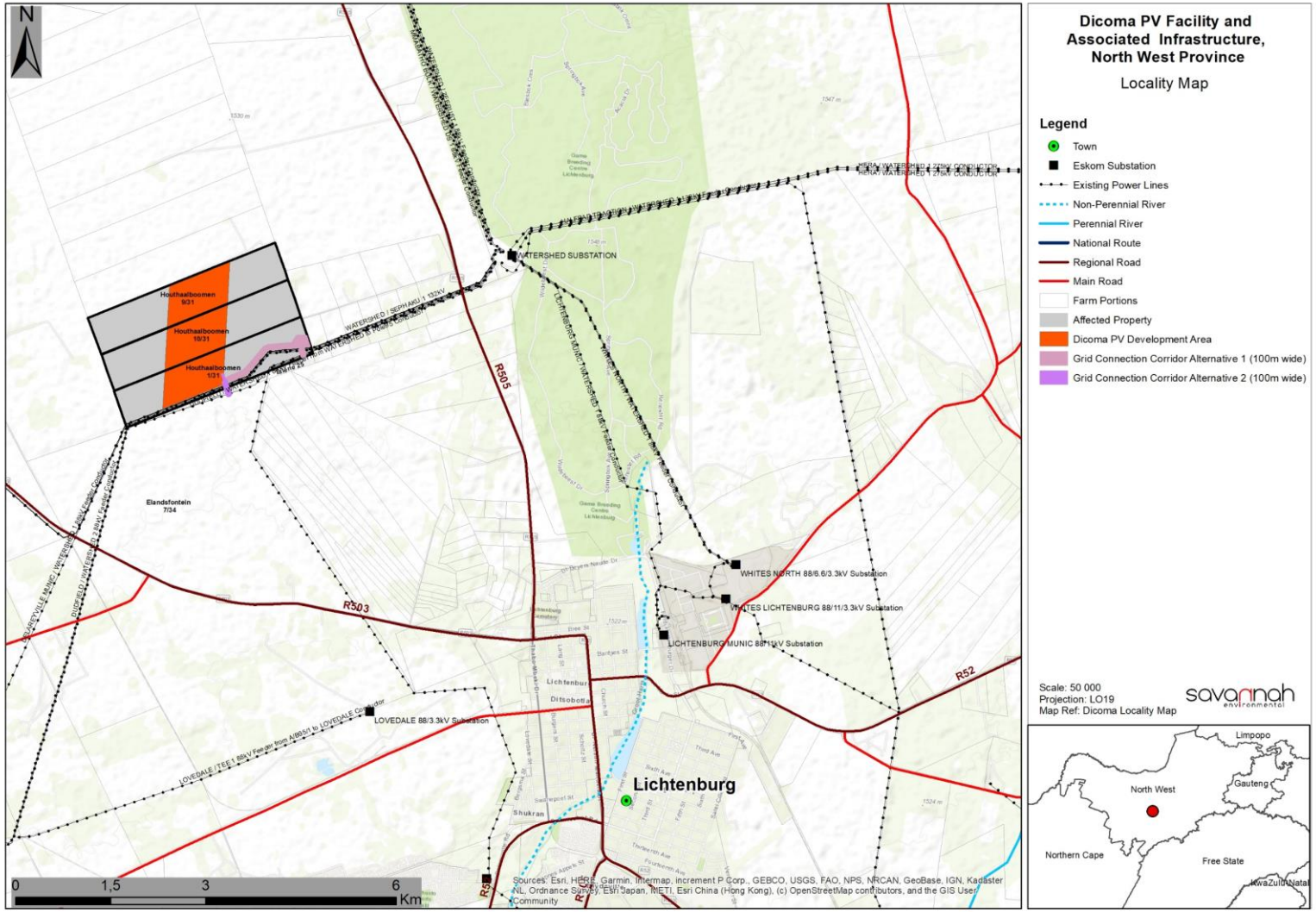

Figure 1.1: Locality map illustrating the location of the Dicoma PV development area within the larger project site, including the grid connection corridor alternatives (refer to **Appendix O** for A3 map).

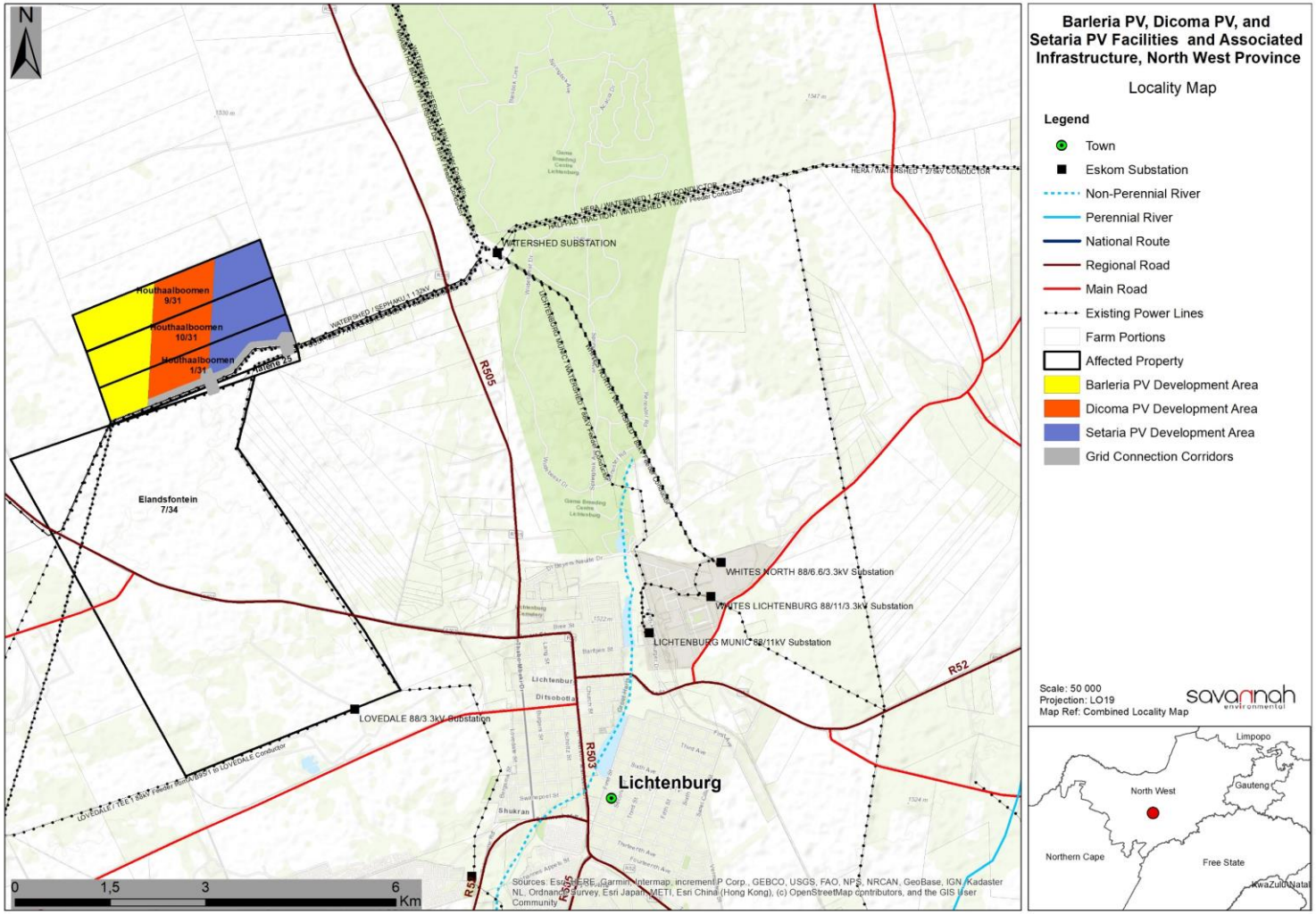

Figure 1.2: Locality map illustrating the locations of the Dicoma PV, Dicoma PV and Setaria PV development areas within the project site (refer to **Appendix O** for A3 map)

1.1 Project Overview

The project site has been identified by the applicant as a technically feasible area which has the potential for the development of a solar PV facility, including a Battery Energy Storage System (BESS) and other associated infrastructure. During the Scoping Phase, the following was considered:

a) full extent of the project site (i.e. approximately 552ha), within which the development area[3] for the project (approximately 179ha) was appropriately located from a technical perspective.
b) Full extent of the development area for the project (approximately 179ha).

The purpose of assessing the full extent of the development area during the Scoping Phase was to determine the suitability from an environmental and social perspective, and to identify areas that should be avoided in development planning. Based on the scoping assessment, areas of environmental sensitivity were identified within the development area. In order to avoid these areas of potential sensitivity identified during the Scoping Phase and to ensure that potential detrimental environmental impacts are minimised as far as possible, the developer identified a suitable development footprint[4] within the development area and planned the PV infrastructure for Dicoma PV to be located. The development footprint has considered the 10m heritage site buffer and have excluded these buffer areas from the PV facility layout. An overview of the project development site is provided in **Table 1.1**

Table 1.1: A detailed description of the Dicoma PV development area

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 (~5km north-west)
Farm name(s) and number(s) of properties affected by the Solar PV Facility	Farm Houthaalboomen 31
Farm Portion(s), Name(s) and Number(s) associated with the PV Facility	Portion 1 of the Farm Houthaalboomen 31 Portion 9 of the Farm Houthaalboomen 31 Portion 10 of the Farm Houthaalboomen 31
Farm Portion(s), Name(s) and Number(s) of properties affected by the Solar PV LILO grid connection	Farm Houthaalboomen 31 Farm Talene 25 Farm Elandsfontein 34
Portion number(s) of properties affected by the Solar PV LILO grid connection	Portion 1 of the Farm Houthaalboomen 31 Portion 0 of Farm Talene 25 Portion 7 of Farm Elandsfontein 34
SG 21 Digit Code (s) for all properties	Portion 1 of the Farm Houthaalboomen 31 - T0IP00000000003100001 Portion 9 of the Farm Houthaalboomen 31 - T0IP00000000003100009 Portion 10 of the Farm Houthaalboomen 31 - T0IP00000000003100010 Portion 0 of Farm Talene 25 - T0IP00000000002500000 Portion 7 of Farm Elandsfontein 34 - T0IP00000000003400007

[3] The development area is that identified area (located within the project extent 552ha) where the Dicoma PV facility facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~179ha in extent.

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

Current zoning	Agricultural (grazing of cattle)		
Current land use	Grazing (mainly cattle)		
Site Extent	~552ha		
PV Development Area	~179ha		
PV Development Footprint	~175ha		
Site Coordinates (project site)		**Latitude:**	**Longitude:**
	Northern point	26° 5'43.47"S	26° 5'45.44"E
	Eastern point	26° 6'6.93"S	26° 6'1.63"E
	Southern point	26° 6'45.37"S	26° 5'48.14"E
	Western point	26° 6'15.94"S	26° 5'28.30"E
	Centre point	26° 6'14.61"S	26° 5'46.69"E

Dicoma PV will have a contracted capacity of up to 75MW and will include specific infrastructure, namely:

» PV modules and mounting structures
» Inverters and transformers
» BESS, Construction and O&M hub:
  - Battery Energy Storage System (BESS)
  - Temporary and permanent laydown area
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage
» Site and internal access roads (up to 8m wide)
» Grid connection solution within a 100m wide corridor, including:
  - 33kV cabling between the project components and the facility substation
  - A 132kV facility substation
  - A 132kV Eskom switching station
  - A Loop-in-Loop out (LILO) overhead 132kV power line between the Eskom switching station and the existing Delareyville Munic–Watershed 1 88kV power line[5].

Two alternative grid connection configurations have been considered for the proposed project. The key infrastructure components proposed as part of the Dicoma PV facility are described in greater detail in Chapter 2 of this Environmental Impact Assessment (EIA) Report.

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

1.2 Requirement for an Environmental Impact Assessment Process

[5] The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

Section 24 of South Africa's National Environmental Management Act (No. 107 of 1998) (NEMA) pertains to Environmental Authorisations (EA), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the Competent Authority. The 2014 Environmental Impact Assessment (EIA) Regulations, as amended (GNR 326) published under NEMA prescribe the process to be followed when applying for 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 Competent Authority.

Various components of the Dicoma PV facility are listed as activities that may have a detrimental impact on the environment. The primary listed activity triggered by Dicoma PV 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. Dicoma PV will have a contracted capacity of up to 75MW.

The Dicoma PV facility requires Environmental Authorisation from the National Department of Forestry, Fisheries and the Environment (DFFE) subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA), as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 326).

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

1.3 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 (as amended) 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
(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 who prepared the report is included in **Section 1.5**. The Curriculum vitae of the Savannah Environmental team has been included as **Appendix A**.
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report , including (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm ame and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties	The location of the Dicoma PV facility has been included under **Section 1.1** and within **Table 1.1**.

(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A locality map illustrating the location of the Dicoma PV facility has been included as **Figure 1.1** in this chapter. A layout map is contained in **Appendix O**

This EIA Report consists of ten chapters, which include:

- **Chapter 1** provides background to the Dicoma PV facility project and the environmental impact assessment.
- **Chapter 2** provides a project description of Dicoma PV.
- **Chapter 3** outlines strategic regulatory and legal context for energy planning in South Africa and specifically relating to the project.
- **Chapter 4** describes the need for and alternatives considered for the Dicoma PV facility.
- **Chapter 5** outlines the approach to undertaking the Scoping/EIA process.
- **Chapter 6** describes the existing biophysical and social environment within and surrounding the study and development area.
- **Chapter 7** provides an assessment of the potential issues associated with the Solar PV facility and associated infrastructure.
- **Chapter 8** presents the assessment of cumulative impacts of the Solar PV Facility.
- **Chapter 9** presents the conclusions and recommendations based on the findings of the EIA Report.
- **Chapter 10** provides references used to compile the EIA report.

1.4 Overview of this Environmental Impact Assessment (EIA) Process

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

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

- The **Scoping Phase** includes the identification of potential issues associated with the project through a desktop study (considering existing information) and consultation with 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 Competent Authority for consideration and acceptance.
- The **EIA Phase** involves a detailed assessment of the potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint within the project site and includes detailed specialist investigations as well as public consultation. Following a public review period of the EIA Report, this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including

recommendations of practical and achievable mitigation and management measures, to the Competent Authority for final review and decision-making.

1.5 Appointment of an Independent Environmental Assessment Practitioner (EAP)

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), the applicant has appointed Savannah Environmental (Pty) Ltd as the independent environmental consultants 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 of or are affiliated to the applicant. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed facility.

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) Contributor. Savannah Environmental's team have been actively involved in undertaking environmental studies since 2006, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development.

The Savannah Environmental team for this project includes:

- ***Rendani Rasivhetshele*** is the principle author of this report. She is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA), and she holds a Bachelor of Science Honours in Environmental Management. She has over 4 years of experience in conducting Environmental Impacts Assessments, public participation, and Environmental Management Programmes for a wide range of projects including renewable energy projects. She is responsible for overall compilation of the EIA report and includes the review of specialist reports and incorporating specialist findings into the Environmental Impact Assessment report and the associated Environmental Management Programme (EMPr).

- ***Jana de Jager*** is the co-author of this report. She holds a bachelor's degree in Environmental Science, an Honours degree in Geography and Environmental Science and is currently undertaking her MSc in Ecological Water Requirements. She has 4 years of experience in the environmental management field. Her key focus is on undertaking environmental impact assessments, GIS mapping, public participation, environmental management plans and programmes. She is registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP).

- **Karen Jodas** holds a Master of Science Degree from Rhodes University and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over

the past 25 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.

» **Nicolene Venter** has over 20 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

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

1.6 Details of the Independent Specialist Team

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

Table 1.2: Independent Specialists that contribute to the EIA Report

Company	Specialist Area of Expertise	Specialist Name
Nkurenkuru Ecology & Biodiversity	Ecology and Wetlands	Gerhard Botha
Pachnoda Consulting	Avifauna	Lukas Niemand
Terra Africa Environmental Consultants	Agricultural Assessment	Marinè Pienaar
LOGIS	Visual	Lourens du Plessis
CTS Heritage	Heritage and Palaeontology	Jenna Lavin
Savannah Environmental and Tony Barbour Consulting.	Social environment	Nondumiso Bulunga and peer reviewed by Tony Barbour.
BVi Consulting Engineers Western Cape (Pty) Ltd	Traffic Impact Assessment	Jacques Nel and Dirk van der Merwe

CHAPTER 2: PROJECT DESCRIPTION

This Chapter provides an overview of the Dicoma PV Facility and details the project scope, which includes the panning/design, construction, operation, and decommissioning activities required for the development.

2.1 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
(d)(ii) a description of the activities to be undertaken including associated structures and infrastructure	A description of the associated infrastructure is included in **Section 2.4**. Activities to be undertaken during the various project development phases is included in **Section 2.6**.

2.2 Project and Site Description

The project site identified for the development of Dicoma PV facility is located 5km north-west of the town Lichtenburg within ward 16 of the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality in the North West Province. The total extent of the project site properties is 552ha. A development area[6] of 179ha has been identified within the project site area for the construction and operation of the Dicoma PV facility and its associated infrastructure, which is assessed within this EIA Report The development area can be accessed via an existing gravel road which tees-off from the R505 regional road.

The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 75MW. A Project site consisting of the farms Portion 1, Portion 9 and Portion 10 of the Farm Houthaalboomen 31 was considered for the Dicoma PV facility. The grid connection for the facility will consist of underground cabling, a facility substation, an Eskom switching substation, and a loop-in loop-out (LILO) power line connection into an existing Eskom power line located to the south of the project site. Two alternative grid connection solutions are proposed and evaluated. To access the facility, an existing gravel road along Portions 5 to 11 of the Farm Talene 25 will also be upgraded.

It must be noted that the development area identified for Dicoma PV facility is located on a site which previously received EA for the development of Watershed PV (Phase 1) (DEA Ref: 14/12/16/3/3/2/556 and (Phase 2) (DEA Ref: 14/12/16/3/3/2/557) Solar Photovoltaic energy facilities. The validity of the EAs have since lapsed, which has made the area available to undertake a new EIA process for a different solar development.

The full extent of the development area and grid connection corridors has been considered within this EIA Report with the aim of determining the suitability from an environmental and social perspective and identifying areas that should be avoided in development planning. Within this identified development area,

[6] The development area is that identified area (located within the project site) where the Dicoma PV facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~179ha in extent.

a development footprint[7] of approximately 175ha has been defined based on the findings of the Scoping Study and will be further assessed within this EIA Report.

From a technical perspective, the Lichtenburg area is considered favourable for the development of commercial solar energy facilities by virtue of the prevailing climatic conditions, relief and aspect, the extent of the project site and development area, the availability of a direct grid connection (i.e. point of connection to the national Eskom grid), and the availability of land on which development can take place.

The type of technology selected for implementation, will be based on the outcomes of the EIA process, and the completion of additional technical studies (e.g. geotechnical and other surveys) to be conducted as part of the detailed design phase and will ultimately influence the final project layout and development footprint. The extent of the development area under investigation allows for layout design and site-specific alternatives to be identified considering the environmental sensitivities present.

Grid connection infrastructure for the Dicoma PV facility will be located outside the PV development area however, within a 100m wide corridor. Two grid connections alternatives have been assessed and include:

Grid Connection Alternative 1: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other approximately 1.3km east of the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV[8] . The grid connection infrastructure is located within an assessment corridor 100m in width.

Grid Connection Alternative 2: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other and infringes on the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV. The grid connection infrastructure is located within an assessment corridor of 100m in width.

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

8 The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

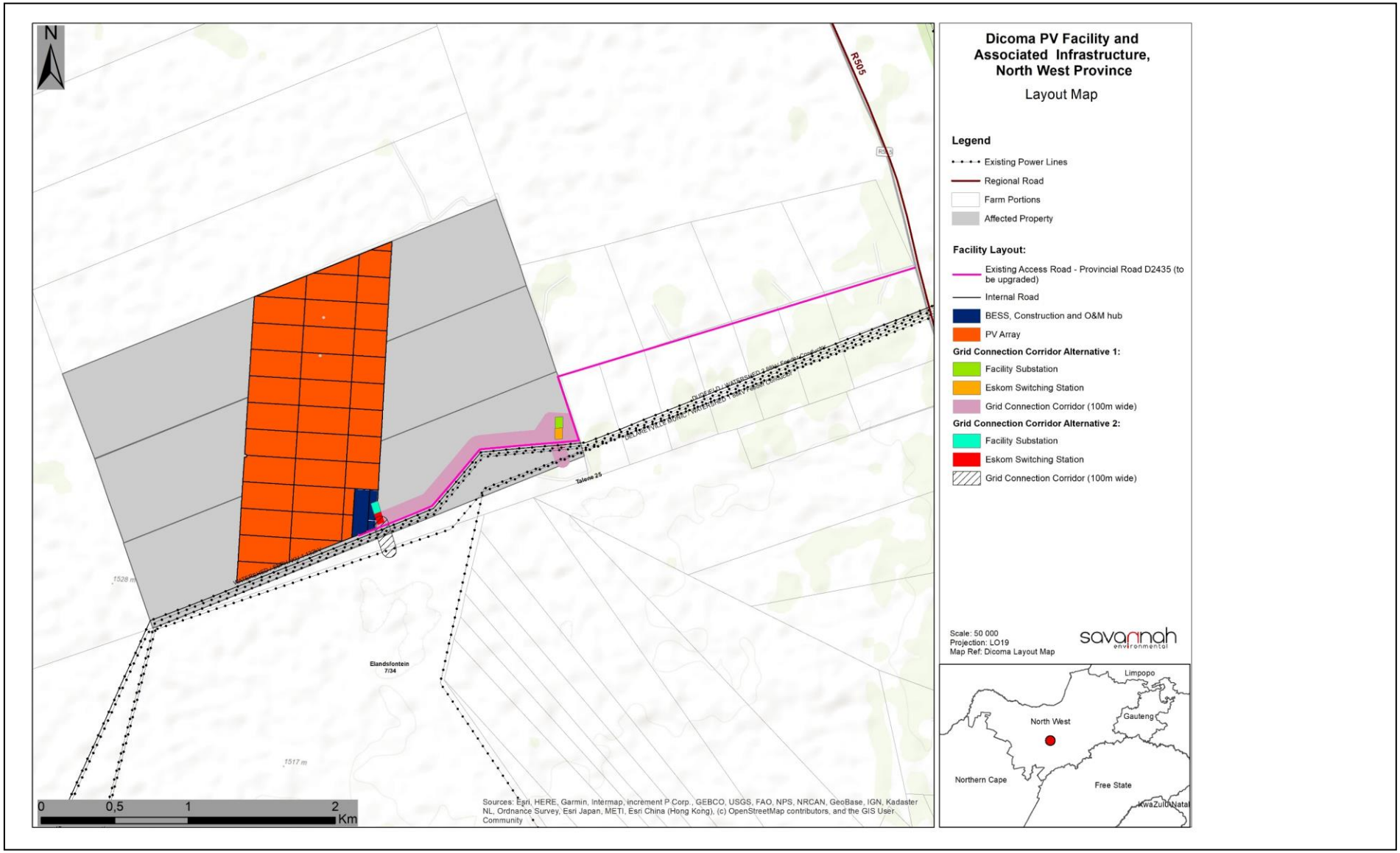

Figure 2.1: Map of the proposed Dicoma PV facility development area & grid connection alternatives.

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

Table 2.1: Details of Dicoma PV facility and associated infrastructure.

Component	Description / Dimensions	
Total extent of the Affected Properties, also referred to as the project site	~552ha in extent	
Total extent of the PV Development area	A smaller focus area identified within the project site based on technical preferences and environmental constraints. Approximately 179ha in extent.	
Development Footprint	All development infrastructure associated with Dicoma PV facility, is located within this area. This area was identified considering and avoiding identified environmental constraints that are present within the development area. Approximately 175ha in extent	
Contracted capacity of the facility	75MW	
Technology	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems	
PV panels	» Height: ~5.5m from ground level (installed). » Between 200 000 – 300 000 panels required.	
Facility Substation	» On-site facility substation with a 132kV capacity located within Portion 1 of the Farm Houthaalboomen 31. » Approximately less than 1ha in extent.	
Eskom Switching Station	» Eskom switching station with a 132kV capacity located within Portion 1 of the Farm Houthaalboomen 31. » Approximately less than 1ha in extent	
Grid Connection	» A 100m wide grid connection corridor within which the LILO grid connection infrastructure will be constructed and operated. » 33kV cabling connecting PV array to facility substation » A loop-in-loop-out overhead 132kV powerline is required for grid connection.	
Coordinates of Grid Connection Corridor Alternatives	**Grid Connection Corridor Alternative 1**	**Grid Connection Corridor Alternative 2**
	Start: 26° 6'37.76"S 26° 6'1.92"E	Start: 26° 6'45.28"S 26° 6'5.33"E
	Middle: 26° 6'22.18"S 26° 6'22.73"E	Middle: 26° 6'41.76"S 26° 6'3.98"E
	End: 26° 6'13.90"S 26° 6'47.71"E	End: 26° 6'37.44"S 26° 6'1.98"E

Site and internal access	» Access to the project development area will be via the R505 regional road and main access to the site will be via an existing gravel District Road (D2435) of approximately 2.5km in length, which will be required to be upgraded to be up to 8m wide to cater for the construction vehicles navigating the road to the laydown areas on site. » A network of gravel internal access roads, each with a width of up to 5m will be constructed to provide access to the various components of the Dicoma PV facility development.
Temporary Laydown area	Up to 3 ha in extent
Permanent laydown area	Less than 1 ha will remain in place for operation
Battery Energy Storage System (BESS)	» Approximately less than 1ha in extent » The BESS Facility proposes to use solid-state technology as a preferred technology
Centre Coordinates BESS, Construction and O&M hub	26° 6'36.63"S 26° 5'56.87"E
Other infrastructure	» Operations and Maintenance buildings » Gate house » Security building » Control centre » Office buildings » Warehouse » Workshop » Visitor's centre
Services required	» Refuse material disposal - all generated refuse material will be collected by a private contractor and will be disposed of at a licensed waste disposal site off site. This service will be arranged with the municipality when required. » Sanitation – All sewage/effluent water will be managed utilising temporary portable chemical toilets. Any other effluent discharge during construction will be stored in sealed containers/tanks and collected (honey-sucker) and treated by a service provider (the LM/ Contractor) at an approved facility off site. These facilities will be maintained and serviced regularly by an appropriate waste contractor. » Water supply – construction water will be sourced from the Ditsobotla Local Municipality (by truck or via pipeline) or from groundwater abstraction. » Electricity supply – approximately 15MW of power may be required during the construction phase. It is proposed that this power be sourced from the existing power lines and/or diesel generators. The necessary applications for the connection to the grid will be submitted to Eskom for approval. » The construction camp will require the necessary services such as potable water, electricity and a package plant for waste.

The type of technology selected for implementation, outcomes of the EIA process, and the completion of additional technical studies (e.g. geotechnical and other surveys) to be conducted as part of the detailed design phase will ultimately influence the final project layout and development footprint. The extent of the project site under investigation allows for layout design and site-specific alternatives to be identified considering the environmental sensitivities present. The final facility design is required to be approved by the DFFE prior to any construction activities commencing on-site. Should any substantive changes or deviations from the original scope or layout of the project reflected in the EIA process occur, DFFE would need to be notified thereof, and where applicable additional approval may need to be obtained.

2.3 Summary of Site Selection Process

The broader study area (i.e. the greater Lichtenburg area) was identified by the applicant as having the potential for the installation of a PV facility on the basis of key technical criteria being met, including the solar resource, accessibility of the site, accessibility to the Eskom grid, and local site topography. The North West receives high daily GHI in South Africa, with the Lichtenburg area at approximately 2143 kWh/m^2/annum. Other activities present within the surrounding areas include power line servitudes associated with the existing and approved grid infrastructure, agricultural activities and the future development of other solar PV facilities that have received EA.

The detail regarding site-specific characteristics which aided the selection of the project site is provided below:

Project site extent, conditions and land availability: Availability of relatively level land of sufficient extent can be a restraining factor to PV development, as a 75 MW solar PV development and associated infrastructure requires sufficient land space. The development area is ~179ha. This area was considered to be sufficient for the planned 75MW PV facility and provides an opportunity for the avoidance of sensitive environmental features and areas. A project development footprint of ~175ha is located within the development area.

Topography: The region within which the project site is located can be described gently undulating topography, with slopes of less than 5% over most of the area, and with an average elevation of ~1500m above sea level. Therefore, the project site and development area conditions are optimal for a development of this nature, with the site being of a suitable gradient for the development of a PV facility.

Site access: The area in which the project site is located can be readily accessed via the N14 national route. The N14 national route provides access to the area from Upington, Pofadder, Springbok and Johannesburg. From the N14, the access point to the project site area will be via the R505 regional road and the main access to the site will be via an existing gravel District Road (D2435) of approximately 2.5km in length.

Land use considerations: The majority of land use activities in the Lichtenburg area are predominately described as maize farming, cattle farming with some mining/quarrying activity (cement works). The Remaining Extent of Portion 1, Portion 9 and Portion 10 of Farm Houthaalboomen No 31 are one of the few available privately-owned land parcels with sufficient space available for solar PV development. Within the proposed Dicoma PV facility project site, there is no cultivated agricultural land, and the land is currently used for livestock grazing.

Grid connection considerations: Ease of access into the Eskom national electricity grid is vital to the viability of a solar energy facility and addresses Eskom's concerns for lower cost connection alternatives given current funding constraints. Dicoma PV facility is intended to connect to the national grid via a loop-in and loop out (LILO) from the Eskom switching station into one of the existing Delareyville Munic–Watershed 1 88kVpower line to the south of the site. Having a grid connection point in close proximity to the project site (< 15km) reduces the necessary grid infrastructure and therefore addresses Eskom's concerns for lower cost connection alternatives given current funding constraints. A shorter grid solution will also ensure that potential environmental impacts are kept to a minimum.

Considering the above, the project site was identified and considered acceptable in terms of the investigations which have come before. The development area and the development footprint has been identified by the developer as suitable areas within which the solar PV facility can be placed from both technical perspective and environmental perspective.

2.4 Description of the Associated Infrastructure

2.4.1 Details of the proposed project infrastructure

Dicoma PV facility will be designed to have a contracted capacity of up to 75MW. 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. PV technology forms part of the energy mix as indicated in the latest IRP for South Africa.

Once installed, the panels will stand less than 5.5 m above ground level. The solar panels will include centralised inverter stations, or string inverters mounted above ground. If centralised inverter stations are used, Medium Voltage (MV) distribution transformers are located internally, whereas string inverters are mounted at the end of tracker tables. The main transformer capacity varies according to detailed design and project-specific requirements.

2.4.2 Water Supply

Dicoma PV facility will utilise water during both the construction and operation phases of development. Water is required during construction for dust suppression, and potable water will be required on site for the construction crew. During operations, water is required to clean the PV panels, for human consumption, and for use in the auxiliary buildings (i.e. for use in the office building, ablutions, and canteen). Approximately 16 000m³ of water may be required over a 12 to 18-month period during construction, and approximately 5 000m³ of water may be required per year over the 20-year operational lifespan of the project.

A request for confirmation of water availability for the construction and operation of the solar energy facility will be submitted to the Ditsobotla Local Municipality during this EIA process.

2.4.3 Energy Storage

The general purpose and utilisation of the Battery Energy Storage System (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, therefore, provide flexibility in the efficient operation of the electricity grid through decoupling of the energy supply and demand and will allow for longer generating periods of the solar PV facility. Furthermore, the development of the BESS for the project is of importance as the system will ensure that electricity is fed into the national grid when required and excess amounts stored. This will allow for extended hours of generation from the 75MW solar energy facility. The BESS will be contained within insulated containers and will connect to the on-site facility substation via underground cabling which will follow the internal access roads of the facility. **Figure 2.2** provides a general illustration of a BESS.

Figure 0.2: Example of battery storage units installed by Tesla (Source: fastcompany.com)

2.4.4 Panel Cleaning

It is anticipated that the PV panels will be washed twice a year during operation. Only clean water (i.e. with no cleaning products), or non-hazardous biodegradable cleaning products will be utilised for the washing of panels. Wastewater generated by washing panels will either be collected and recycled for future use, or alternatively, in the event that an environmentally friendly non-hazardous biodegradable cleaning product is utilised, wastewater can be allowed to run-off under the panels.

2.4.5 Effluent and Wastewater

During construction, chemical toilets will be used. These will be serviced regularly, and effluent will be disposed of at a registered wastewater treatment works. Any other effluent discharge during construction will be stored in sealed containers/tanks and collected (honey-sucker) and treated by a service provider (the LM/ Contractor) at an approved facility off site. These facilities will be maintained and serviced regularly by an appropriate waste contractor.

A formal request for confirmation of WWTW capacity to treat effluent generated during the construction and operation of the solar energy facility has bee submitted to the Ditsobotla Local Municipality.

2.4.6 Waste

Solid waste generated during construction will mainly be in the form of construction material, excavated substrate and domestic solid waste. Waste will be disposed of in either waste skips and/or scavenger proof recycling bins (where possible) and temporarily placed in a central location for removal by an appropriate contractor. Where possible, waste will be recycled. Non-recyclable solid construction waste will be temporarily held in skips or other appropriate waste containers to be disposed of at an appropriately licensed landfill site. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility.

During construction, use of the following hazardous substances are anticipated: paint, grease, petrol / diesel for trucks, cranes, and other vehicles, limited amounts of transformer oils, and chemicals. Dangerous goods required to be stored during construction (e.g. limited quantities of fuel, oil, lubricants etc.) will be stored in compliance with relevant legislation (i.e. stored on covered and bunded areas/bins, and disposed of at a registered hazardous waste site). Hazardous waste will be appropriately stored and disposed of.

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

Dicoma PV facility will have a contracted capacity of 75MW and will make use of PV technology. Solar energy facilities, which utilise PV technology, use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity (refer to **Figure 2.3**).

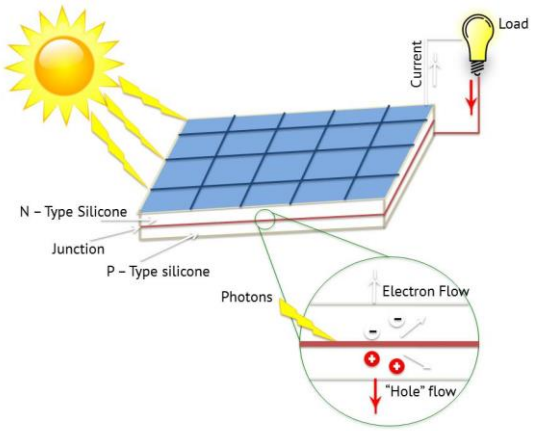

Figure 0.3: Diagram illustrating the Photovoltaic Effect (Source: Centre for Sustainable Energy)

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

Photovoltaic Cells

A PV cell is made of silicone that acts as a semi-conductor used to produce the Photovoltaic Effect. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV panel (refer to **Figure 2.4**). 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[9])).

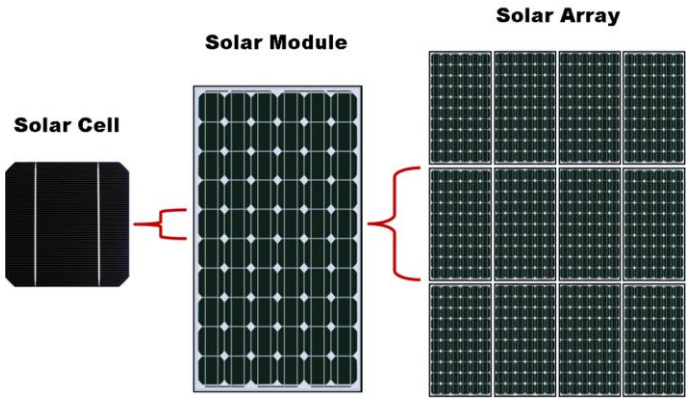

Figure 0.4: Overview of a PV cell, module and array / panel (Source: pveducation.com)

Support Structures

PV panels will be fixed to a support structure. PV panels can either utilise fixed/static support structures, or single or double axis tracking support structures (refer to **Figure 2.5**). 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.

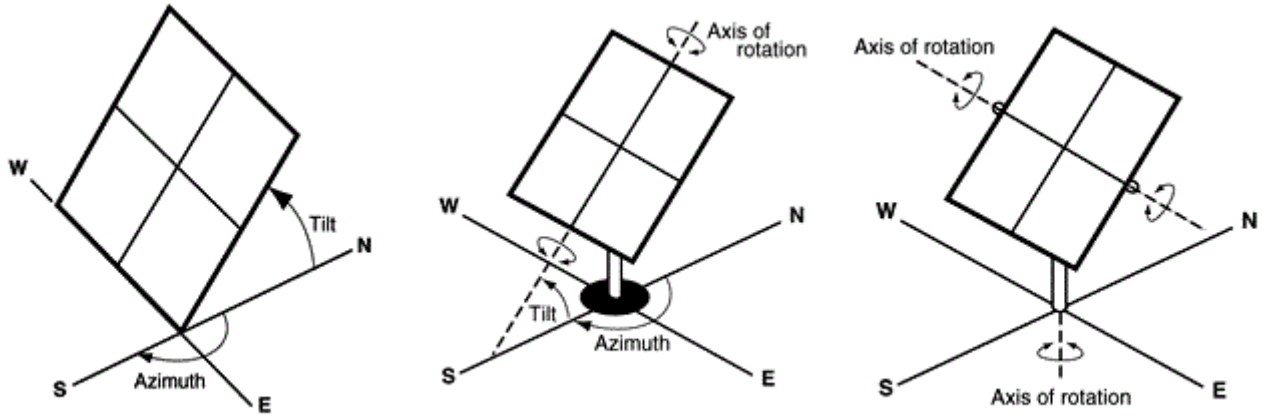

Figure 0.5: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

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

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

2.6 Activities during the Project Development Stages

A series of activities are proposed as part of the design, pre-construction, construction, operation, and decommissioning phases associated with the development of the Dicoma PV facility. These are discussed in more detail under the respective sub-headings below.

2.6.1 Design and Pre-Construction Phase

Planning: Several post-authorisation factors are expected to influence the final design of the solar energy facility and could result in small-scale modifications of the PV array and/or associated infrastructure. An objective of the Engineering, Procurement and Construction (EPC) Contractor, who will be responsible for the overall construction of the project, will be to comply with the approved facility design as far as possible. It should be understood, however, that the construction process is dynamic and that unforeseen changes to the project specifications may take place. This EIA Report therefore describes the project in terms of the best available knowledge at the time. The final facility design is required to be approved by the DFFE. Importantly, should there be any substantive changes or deviations from the original scope or layout of the project, the DFFE will need to be notified and where relevant, environmental approval obtained.

Conduct Surveys: Prior to initiating construction, a number of surveys will be required including, but not limited to, confirmation of the micro-siting footprint (i.e. the precise location of the PV panels, on-site facility substation and the associated infrastructure) and a geotechnical survey. Geotechnical surveys acquire information regarding the physical characteristics of soil and rocks underlying a proposed project site and informs the design of earthworks and foundations for structures.

2.6.2 Construction Phase

The construction phase will take approximately 12 to 18 months to complete, and will entail a series of activities including:

Procurement and employment

At the peak of construction, the project is likely to create a maximum of 350 employment opportunities. These employment opportunities will be temporary and will last for a period of approximately 12 to 18 months (i.e. the length of construction). Employment opportunities generated during the construction phase will include low skilled, semi-skilled, and skilled opportunities. Solar PV projects make use of high levels of unskilled and semi-skilled labour so there will be good opportunity to use local labour, where available. Employment opportunities will peak during the construction phase and significantly decline during the operation phase. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.

Establishment of an Access Road

Access to the development area will be established for the construction and operation of Dicoma PV facility. Access to the project site can be accessed via an existing gravel road which tees-off from the R505 regional road. Within the development footprint itself, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). The facility layout that is

being assessed within this EIA report has been determined following the identification of site related sensitivities.

Undertake Site Preparation

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

Transport of Components and Equipment to Site

The national, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase. Some of the components (i.e. substation transformer) may be defined as abnormal loads in terms of the National Road Traffic Act (No. 93 of 1996) (NRTO)[10] by virtue of the dimensional limitations. Typical civil engineering construction equipment will need to be brought to the project 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 on-site facility substation and site preparation.

Establishment of Laydown Areas on Site

Laydown and storage areas will be required for typical construction equipment. Once the required equipment has been transported to site, a dedicated equipment construction camp and laydown area will need to be established adjacent to the workshop area. The equipment construction camp serves to confine activities and storage of equipment to one designated area, to limit the potential ecological impacts associated with this phase of the development. The laydown area will be used for the assembly of the PV panels, and the general placement/storage of construction equipment. The temporary laydown area will be included within development footprint of the solar facility.

Erect PV Panels and Construct Substation and Invertors

The construction phase involves installation of the PV solar panels, structural and electrical infrastructure required for the operation of the Dicoma PV facility. In addition, preparation of the soil and improvement of the access roads are likely to continue for most of the construction phase. For array installations, vertical support posts will be driven into the ground. Depending on the results of the geotechnical report, a different foundation method, such as screw pile, helical pile, micropile or drilled post/piles could be used. The posts will hold the support structures (tables) on which the PV modules would be mounted. Brackets will attach the PV modules to the tables. Trenches are to be dug for the underground AC and DC cabling, and the foundations of the inverter enclosures and transformers will be prepared. While cables are being laid and combiner boxes are being installed, the PV tables will be erected. Wire harnesses will connect the PV modules to the electrical collection systems. Underground cables and overhead circuits will connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure, and ultimately the facility substation.

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

[10] A permit will be required in accordance with Section 81 of the National Road Traffic Act (No. 93 of 1996) (NRTA) which pertains to vehicles and loads which may be exempted from provisions of Act.

Establishment of Ancillary Infrastructure

The establishment of the ancillary infrastructure and support buildings will require the clearing of vegetation and levelling of the development footprint, and the excavation of foundations prior to construction. Laydown areas for building materials and equipment associated with these buildings will also be required.

Undertake Site Rehabilitation

Once construction is completed and all construction equipment has been removed, the project site will be rehabilitated where practical and reasonable. In addition, on full commissioning of the Dicoma PV facility, any access points which are not required during operation must be closed and rehabilitated accordingly.

2.6.3 Operation Phase

The Dicoma PV facility is expected to operate for a minimum of 20 years. The facility will operate continuously, 7 days a week, and will include battery storage. While the solar facility will be largely self-sufficient, monitoring and periodic maintenance activities will be required. Key elements of the Operation and Maintenance (O&M) plan include monitoring and reporting the performance of the solar energy facility, conducting preventative and corrective maintenance, receiving visitors, and maintaining security.

The operation phase will create approximately 50 full-time equivalent employment positions which will include low-skilled, semi-skilled and skilled personnel. Employees that can be sourced from the local municipal area include the less skilled and semi-skilled personnel (such as safety and security staff and certain maintenance crew). Highly skilled personnel may need to be recruited from outside the local area where these resources are not available within the area.

2.6.4 Decommissioning Phase

Depending on the continued economic viability of Dicoma PV facility, following the initial 20-year operation lifespan, the solar energy facility will either be decommissioned, or the operation phase will be extended. If it is deemed financially viable to extend the operation phase, existing components would either continue to operate or be dissembled and replaced with new, more efficient technology/ infrastructure available at the time. If the decision is made to decommission the facility, the following decommissioning activities will take place:

Site Preparation

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

Disassembly and removal of existing components

When the solar energy facility is ultimately decommissioned, the equipment to be removed will depend on the land use proposed for the project site at the time. All above ground facilities that are not intended for future use will be removed. Much of the above ground wire, steel, and PV panels of which the system is comprised are recyclable materials and would be recycled to the extent feasible. The components of the solar energy facility would be de-constructed and recycled or disposed of in accordance with applicable regulatory requirements. The site will be rehabilitated where required and can potentially be returned to a beneficial land-use.

Future plans for the site and infrastructure after decommissioning

The generation capacity of the facility would have degraded by approximately 15% over the 20-year operational lifespan. The solar energy facility will potentially have the opportunity to generate power for a Merchant Market operation (i.e. the client would sell power on a bid basis to the market). Another option for the site after decommissioning is for agricultural activities to resume.

CHAPTER 3: POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policy and legislative context within which the development of the solar PV facility is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable or have bearing on the proposed activity, and which are required to be considered in the assessment 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 Environmental Impact Assessment Report:

Requirement	Relevant Section
(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 3 provides an overview of the policy and legislative context which is considered to be associated with the development of the Dicoma PV 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 Dicoma PV facility is proposed is included in **sections 3.3, 3.4, 3.5** and **3.6.**

3.2 Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by 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 3.1**. 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 the Dicoma PV 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.

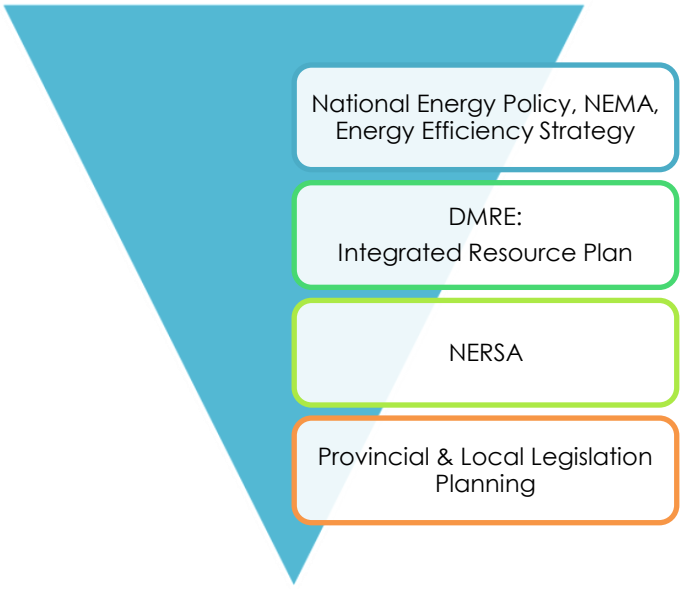

Figure 3.1: Hierarchy of electricity and planning documents

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. DFFE is the Competent Authority for this project (as per GN R779 of 01 July 2016) and is charged with granting the EA for the project under consideration.
- **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 Human Settlements, Water and Sanitation (DHSWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation).
- **The Department of Agriculture, Land Reform, and Rural Development (DALRRD):** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector
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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 (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.

The relevant legislation and policies listed and discussed below are relevant to the Dicoma PV facility development.

3.3 Policy and Planning Considerations on International, National, Provincial and Local Levels

3.3.1 Policy and planning on an International Level

South Africa has committed to various international policies which relate to environmental concerns, specifically that of climate change and global warming. **Table 3.1** below provides a summary of the international policies and plans that South Africa has made commitments towards, and how the proposed development of the Dicoma PV facility aligns with the thinking or commitments of these agreements.

Table 3.1: International policies and plans relevant to the Dicoma PV facility

Policy or Plan	Is the development of the Dicoma PV facility aligned with this policy or plan?
The Kyoto Protocol, 1997	Yes. 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 Dicoma PV facility will enable the evacuation of additional 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.
United Nations Framework Convention on Climate Change and COP21 – Paris Agreement	Yes. South Africa supports the adoption of the Paris Agreement which has the main objective of addressing the climate change issue and marks the first international political response to climate change. South Africa has set out a goal of 17GW of renewable energy by 2030 within the IRP of 2019. Through the development of renewable energy

Policy or Plan	Is the development of the Dicoma PV facility aligned with this policy or plan?
	projects (including Dicoma PV facility) additional renewable energy will be made available to the country, which in turn will demonstrate the contribution that South Africa is making to the global response to climate change specifically relating to the development of the renewable energy sector.
The Equator Principles 4 (October 2020)	Yes. The Equator Principles 4 constitute a financial industry benchmark used for determining, assessing, and managing a project's environmental and social risks. The Equator Principles (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 and apply globally to all industry sectors. 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 Dicoma PV facility is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended (GNR 326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.
International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability, January 2012	Yes. The overall objectives of the IFC performance standards are to fight poverty, do no harm to people or the environment, fight climate change by promoting low carbon development, respect human rights, promote gender equality, provide information prior to project development, collaborate with the project developer in order to achieve the performance standard, provide advisory services and notify countries of trans boundary impacts. When considering the development of the grid connection infrastructure associated with the development of Dicoma PV facility the following performance standards are anticipated to be applicable at this stage of the BA process: » *Performance Standard 1:* Assessment and Management of Environmental and Social Risks and Impacts » *Performance Standard 2:* Labour and Working Conditions » *Performance Standard 3:* Resource Efficiency and Pollution Prevention » *Performance Standard 4:* Community Health, Safety and Security » *Performance Standard 6:* Biodiversity Conservation and Sustainable Management of Living Natural Resources » *Performance Standard 8:* Cultural Heritage

3.3.2 Policy and planning on a National Level

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. To date, the Department has procured 6 422MW of renewable energy capacity from 112 independent power producers (IPPs), with 4 742MW operational and made available to the grid[11]. National

[11]http://www.nersa.org.za/wp-content/uploads/2021/05/Monitoring-of-Renewable-Energy-Performance-of-Power-Plants-%E2%80%93-Performance-of-Power-Plants-in-2020

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 3.2**. The development of Dicoma PV facility is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 3.2: Relevant national legislation and policies relevant to the Dicoma PV facility

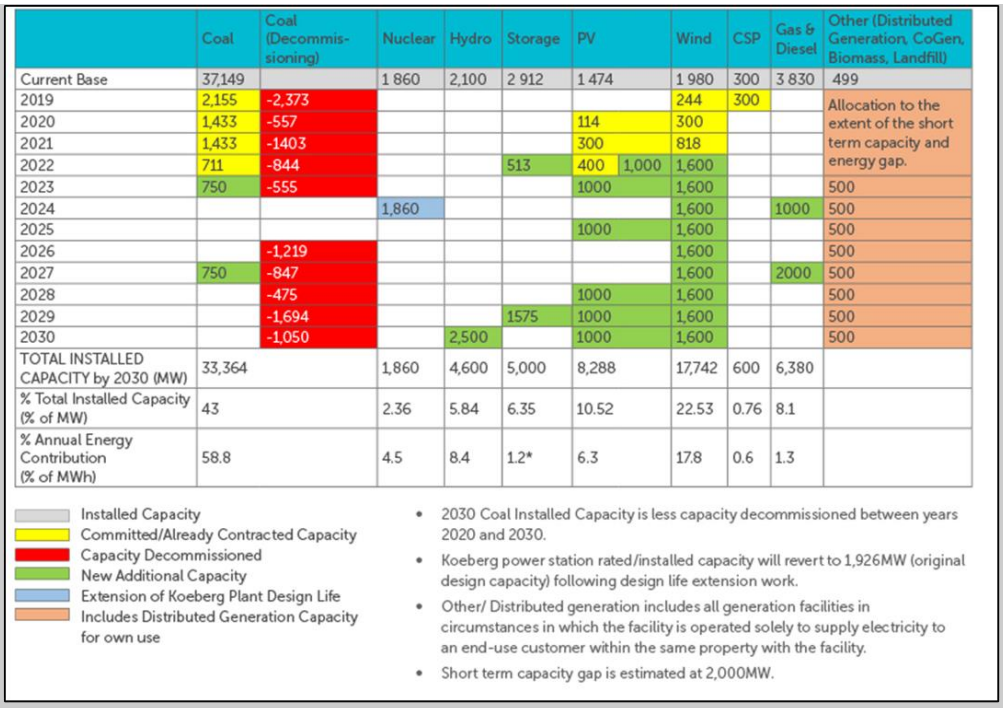
Relevant legislation or policy	Relevance to Dicoma PV facility
Constitution of the Republic of South Africa, 1996	Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to 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.
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 need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.
White Paper on the Energy Policy of the Republic of South Africa (1998)	The South African Energy Policy, published by the then Department of Minerals Resources and Energy (DMRE) in December 1998 identifies five key objectives, namely: » Increasing access to affordable energy services. » Improving energy sector governance. » Stimulating economic development. » Managing energy-related environmental impacts. » Securing supply through diversity. In order to meet these objectives and the developmental and socio-economic objectives of South Africa, the country needs to optimally use available energy resources. The South African Government is required to address what can be done to meet these electricity needs both in the short and long-term. The Energy Policy identifies key objectives for energy supply, such as increasing access to affordable

Relevant legislation or policy	Relevance to Dicoma PV facility
	energy services, managing energy-related environmental impacts and securing energy supply through diversifying South Africa's electricity mix. This policy recognises that renewable energy applications have specific characteristics which need to be considered. The Energy Policy is "*based on the understanding that renewables are energy sources in their own right, and are not limited to small-scale and remote applications, and have significant medium- and long-term commercial potential*." In addition, the Energy Policy states that "*Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future*". The support for the Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly wind and solar, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology), more so when social and environmental costs are taken into account. In spite of this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa. Government policy on renewable energy is therefore concerned with addressing the following challenges: » Ensuring that economically feasible technologies and applications are implemented. » Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options. » Addressing constraints on the development of the renewable industry.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	The White Paper on Renewable Energy Policy supplements the Government's overarching policy on energy as set out in its White Paper on the Energy Policy of the Republic of South Africa (DME, 1998), which pledges '*Government support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications'*. This White Paper on Renewable Energy sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The main aim of the policy is to create the conditions for the development and commercial implementation of renewable technologies. The position of the White Paper on Renewable Energy is based on the integrated resource planning criterion of: "*Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options.*" The White Paper on Renewable Energy sets out the Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable

Relevant legislation or policy	Relevance to Dicoma PV facility
	energy in South Africa. It also informs the public and the international community of the Government's vision, and how the Government intends to achieve these objectives; and informs Government agencies and organs of their roles in achieving the objectives. South Africa relies heavily on coal to meet its energy needs because it is well-endowed with coal resources in particular. However, South Africa is endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, but which have so far remained largely untapped. This White Paper fosters the uptake of renewable energy in the economy and has a number of objectives that include: Article I. Ensuring that equitable resources are invested in renewable technologies. Article II. Directing public resources for implementation of renewable energy technologies. Article III. Introducing suitable fiscal incentives for renewable energy. Article IV. Creating an investment climate for the development of renewable energy sector. The objectives of the White Paper on Renewable Energy are considered in six focal areas, namely: i) Financial instruments. ii) Legal instruments. iii) Technology development. iv) Awareness raising. v) Capacity building and education. vi) Market based instruments and regulatory instruments. This policy supports the investment in renewable energy facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing Greenhouse Gas (GHG) emissions and the promotion of renewable energy sources.
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 environmental management requirements into account. In addition, the Act also provides for energy planning, and increased generation and consumption of Renewable Energies (REs). The Act provides the legal framework which supports the development of RE facilities for the greater environmental and social good and provides the backdrop against which South Africa's strategic planning regarding future electricity provision and supply takes place.
The Electricity Regulation Act (No. of 2006)	The Electricity Regulation Act (ERA) (No. 04 of 2006) as amended by the Electricity Regulation Act (No. 28 of 2007), replaced the Electricity Act (No. 41 of 1987), as amended, with the exception of Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry.

Relevant legislation or policy	Relevance to Dicoma PV facility
	The ERA establishes a national regulatory framework for the electricity supply industry and made NERSA custodian and enforcer of the National Electricity Regulatory Framework. The ERA also provides for licences and registration as the manner in which the generation, transmission, distribution, reticulation, trading, and import and export of electricity is regulated.
Integrated Energy Plan (IEP), November 2016	The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include: » To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector. » To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels). » To guide investment in and the development of energy infrastructure in South Africa. » To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors. A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to take into account changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others. The 8 key objectives of the integrated energy planning process are as follows: » Objective 1: Ensure security of supply. » Objective 2: Minimise the cost of energy. » Objective 3: Promote the creation of jobs and localisation. » Objective 4: Minimise negative environmental impacts from the energy sector. » Objective 5: Promote the conservation of water. » 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 is a subset of the IEP and constitutes South Africa's National electricity plan. The IRP is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment. The primary objective of the IRP is to determine the long term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as

Relevant legislation or policy	Relevance to Dicoma PV facility
	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. Following the promulgation of the IRP 2010–2030, implementation followed in line with Ministerial Determinations issued under Section 34 of the Electricity Regulation Act (Act No. 4 of 2006). The Ministerial Determinations give effect to planned infrastructure by facilitating the procurement of the required electricity capacity. Since the promulgated IRP 2010–2030, the following capacity developments have taken place: » A total 6 422MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3 876MW operational and made available to the grid. » IPPs have commissioned 1 005MW from two Open Cycle Gas Turbine (OCGT) peaking plants. » Under the Eskom build programme, the following capacity has been commissioned: * 1 332MW of Ingula pumped storage, 1 588MW of Medupi, 800MW of Kusile and * 100MW 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 Plan was promulgated.

Relevant legislation or policy	Relevance to Dicoma PV facility
	

	Coal	Coal (Decommis-sioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1 860	2,100	2 912	1 474	1 980	300	3 830	499
2019	2,155	-2,373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1,433	-557				114	300			
2021	1,433	-1403				300	818			
2022	711	-844			513	400 1,000	1,600			
2023	750	-555				1000	1,600			500
2024			1,860				1,600		1000	500
2025						1000	1,600			500
2026		-1,219					1,600			500
2027	750	-847					1,600		2000	500
2028		-475				1000	1,600			500
2029		-1,694			1575	1000	1,600			500
2030		-1,050		2,500		1000	1,600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

Installed Capacity
Committed/Already Contracted Capacity
Capacity Decommissioned
New Additional Capacity
Extension of Koeberg Plant Design Life
Includes Distributed Generation Capacity for own use

- 2030 Coal Installed Capacity is less capacity decommissioned between years 2020 and 2030.
- Koeberg power station rated/installed capacity will revert to 1,926MW (original design capacity) following design life extension work.
- Other/ Distributed generation includes all generation facilities in circumstances in which the facility is operated solely to supply electricity to an end-use customer within the same property with the facility.
- Short term capacity gap is estimated at 2,000MW.

IRP 2019 as promulgated in October 2019[12]

This plan provides for the development of 6000MW of new capacity from large scale PV. The Dicoma PV Facility project would contribute towards this goal through the generation of 400MW.

Renewable Energy Policy in South Africa	Yes. Support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable energy resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. However, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been largely neglected in South Africa. Challenges regarding the implementation of renewable energy have been identified. Through the development of renewable energy projects (including the Dicoma PV facility), additional renewable energy will be made available which will assist with the further growth and development of the renewable energy sector.
National Development Plan 2030	The National Development Plan (NDP) 2030 offers a long-term plan for the country. It defines desired destinations where inequality and unemployment are reduced, and poverty is eliminated so that all South Africans can attain a decent standard of living. Electricity is one of the core elements of a decent standard of living. While the achievement of the objectives of the NDP requires progress on a broad front, three priorities stand out, namely:

[12] source: 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 Dicoma PV facility
	» Raising employment through faster economic growth » Improving the quality of education, skills development and innovation » Building the capability of the state to play a developmental, transformative role In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes: » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and 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.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility: » SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities. » SIP 9: Electricity generation to support socio-economic development: The proposed Dicoma PV Facility is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department Mineral Resources and Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. The Dicoma PV Facility could be registered as a SIP project once it is under development. The project would then contribute to the above-mentioned SIPs.

Relevant legislation or policy	Relevance to Dicoma PV facility
New Growth Path (NGP) Framework, 2010	Yes. 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 through the green economy. With economic growth and employment creation as the key indicators identified in the NGP. 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. The Dicoma PV facility will assist with the creation of both temporary and permanent employment opportunities during the construction and operation phases, which will contribute, albeit to a limited extent, to the economy and sustainable growth.
National Climate Change Response Strategy for South Africa, 2004	The need for a national climate change policy for South Africa was identified as an urgent requirement during the preparations for the ratification of the UNFCCC in 1997. A process to develop such a policy was thus instituted under the auspices of the National Committee for Climate Change (NCCC), a non-statutory stakeholder body set up in 1994 to advise the Minister on climate change issues and chaired by the then Department of Environmental Affairs and Tourism (DEAT). It was determined that a national climate change response strategy will promote integration between the programmes of the various government departments involved to maximise the benefits to the country as a whole, while minimising negative impacts. Further, as climate change response actions can potentially act as a significant factor in boosting sustainable economic and social development, a national strategy specifically designed to bring this about is clearly in the national interest, supporting the major objectives of the government including poverty alleviation and the creation of jobs. A number of principles and factors guided the conception of the strategy and is required to be implemented. These are: » Ensuring that the strategy is consistent with national priorities, including poverty alleviation, access to basic amenities including infrastructure development, job creation, rural development, foreign investment, human resource development and improved health, leading to sustainable economic growth; » Ensuring alignment with the need to consistently use locally available resources; » Ensuring compliance with international obligations; » Recognizing that climate change is a cross cutting issue that demands integration across the work programmes of other departments and stakeholders, and across many sectors of industry, business and the community; » Focussing on those areas that promote sustainable development; » Promoting programmes that will build capacity, raise awareness and improve education in climate change issues; » Encouraging programmes that will harness existing national technological competencies; » Reviewing the strategy constantly in the light of national priorities and international trends; » Recognizing that South Africa's emissions will continue to increase as development is realised.

Relevant legislation or policy	Relevance to Dicoma PV facility
	The strategy was devised through an integrated approach and considers policies and programmes of other government departments and the fact that South Africa is a developing country. This will ensure that the principles of sustainable development are adequately served and do not conflict with existing development policies.
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 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 Dicoma PV, 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 National Climate Change Bill ("the Bill") for public comment. The purpose of the Bill is to build an effective climate change response and ensure the long-term, just transition to a climate resilient and lower carbon economy and society. This will be done within the context of sustainable development for South Africa, and will provide for all matters related to climate change. The National Climate Change Bill addresses issues related to institutional and coordination arrangement across the three spheres of government namely national, provincial and local. It further highlights the need for the spheres of government and entities, sectors as well business to respond to challenges of climate change. The Bill further addresses the matters relating to, the national adaptation to impacts of climate change, greenhouse gas emissions and removals, and policy alignment and institutional arrangements. The Bill provides a procedural outline that will be developed

Relevant legislation or policy	Relevance to Dicoma PV facility
	through the creation of frameworks and plans. The following objectives are set within the Bill: a) Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance; b) Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response; c) Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner. Dicoma PV Facility comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

3.3.3 Policy and planning at a Provincial Level

A brief review of the most relevant provincial policies is provided below in **Table 3.3**. 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 3.3: Relevant provincial legislation and policies for Dicoma PV

Relevant policy	Relevance to Dicoma PV 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 appropriate financial and fiscal instruments. With the developed and proposed independent power producer capacity (including the Dicoma PV 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

Relevant policy	Relevance to Dicoma PV facility
	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. 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),

Relevant policy	Relevance to Dicoma PV facility
	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. 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.

3.3.4 Policy and planning at a Local Level

The local tiers of government relevant to the Dicoma PV 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 Dicoma PV facility. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 3.4: Relevant district and local legislation and policies for Dicoma PV facility

Relevant policy	Relevance to Dicoma PV 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 Dicoma PV 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 Integrated Development Plan (IDP), 2017 – 2018 and draft reviewed 2020-2021	The vision statement for the Ditsobotla LM as contained within the IDP 2017 – 2018 is as follows: "*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*."

Relevant policy	Relevance to Dicoma PV facility

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

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

The implementation of Dicoma PV 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.

CHAPTER 4: NEED AND DESIRABILITY & ALTERNATIVES

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

This Chapter provides an overview of the suitability of the Dicoma PV facility being developed at the preferred project location from an international, national, regional, and site-specific perspective. It provides an overview of the need and desirability, and perceived benefits of the project specifically. This Chapter provides an overview of the various alternatives considered for Dicoma PV facility as part of the EIA Process.

4.1 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: Scope of Assessment and Content of Environmental Impact Assessment Report:

Requirement	Relevant Section
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	The need and desirability for the development of the Dicoma PV facility is included and discussed within this chapter. The need and desirability for the development of the PV facility has been considered from an international, national, regional and site-specific perspective.
(h) a full description of the process followed to reach the proposed development footprint within the approved site, including (i) details of the development footprint alternatives considered	The details of the alternatives considered as part of the Dicoma PV facility and as part of the EIA Phase have been included in **Section 4.7**.
(h)(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such	The details of the alternatives considered as part of the Dicoma PV facility and as part of the EIA Phase have been included in **Section 4.7**. Where no alternatives are being considered a motivation has been included.

4.2 Need and Desirability from an International Perspective

The need and desirability of the Dicoma PV 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 aim of the goal being to ensure access to affordable, reliable, sustainable and modern energy for all. The following targets and indicators have been set for Goal 7:

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

The development of the Dicoma PV facility would contribute positively towards Goal 7 of the SDGs through the following:

- By generating up to 75MW_{AC} of affordable and clean energy.
  - A study published by the CSIR on 14 October 2016 ("Cost of new power generators in South Africa Comparative analysis based on recent Independent Power Producer (IPP) announcements", Dr Tobias Bischof-Niemz and Ruan Fourie) which took into consideration the results of the cost prices bid successfully under the Department of Mineral Resources and Energy's Renewable Energy (RE) IPP and Coal Baseload IPP Procurement Programmes, found that solar PV and wind were 40% cheaper than new baseload coal (i.e. R0.62/kWh for PV and wind vs R1.03 for coal).
  - PV 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.

4.3 Need and Desirability from a National Perspective

The Dicoma PV facility is proposed in specific response to a National Government initiative, the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). This programme was initiated in order to give effect to the requirements of the IRP with regards to renewable energy targets. As a result, the need and desirability of the Dicoma PV 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 3**). 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.

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

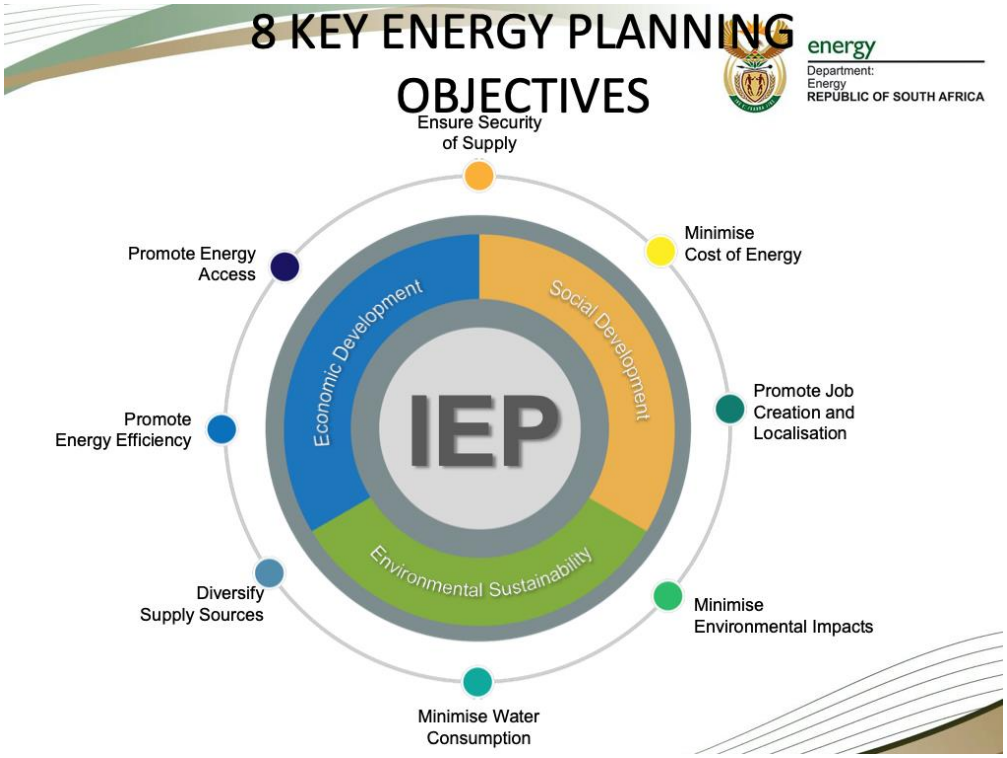


Figure 4.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

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

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

» *Solar should play a much more significant role in the electricity generation mix than it has done historically and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV. Solar PV includes*

large scale installations for power generation which supply to the grid and individual, off-grid solar home systems and rooftop panels.

- *Several interventions which could enhance the future solar energy landscape are recommended as follows: –Large scale CSP projects with proven thermal storage technologies and hybridisation / industrial steam application projects should be incentivised in the short to medium term. In the long term, the existing incentives could be extended to promote locally developed CSP technology storage solutions and large-scale solar fuel projects.*
- *A thorough solar resource assessment for South Africa should continue to be undertaken in the North West 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 Integrated Resource Plan 2019 is South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. The consideration of GHG emissions in the determination of the energy generation mix indicates government's commitment to international obligations under the Paris Agreement.

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). . Provision has been made for new additional capacities in the IRP 2019 (refer to **Table 4.1**).

Table 4.1: 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. Under the REIPPPP , the DMRE intends to secure 14 725MW of electricity from renewable energy generation facilities utilising either onshore wind, concentrated solar thermal, solar photovoltaic (PV), biomass, biogas, landfill gas, or hydro across a number of bidding windows, while simultaneously contributing towards socio-economic development. A total of 1 474MW[13] of PV generated electricity has been awarded to preferred bidders across four (4) rounds of bidding to date, with 814MW still remaining to be allocated in subsequent bidding rounds. Preferred bidders identified under any IPP Procurement Programme, including the REIPPPP,

[13] 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

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.

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

» The utilisation, application and investment in renewable energy resources in South Africa is considered to be an essential means of reducing the carbon footprint of the country,
» Diversifying the national economy,
» Reducing poverty, and
» Providing critical additional energy to that provided by 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 (refer to **Figure 4.2**).
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.

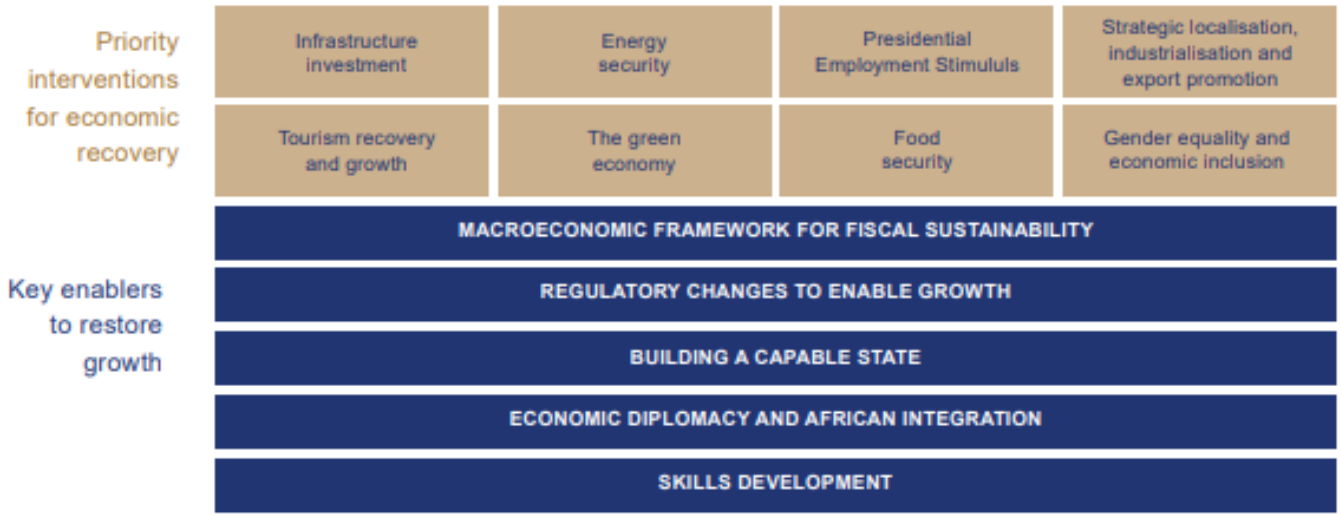


Figure 4.2: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

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

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 the Dicoma PV 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).

Dicoma PV will make use of renewable energy technology and would contribute positively towards reducing South Africa's GHG emissions and ensure compliance with all applicable legislation and permitting requirements. In addition, by making use of PV technology, Dicoma PV would have reduced water requirements when compared with some other generation technologies in alignment with one of the vision 2030 themes of the then-Department of Water and Sanitation's (now the Department of Human Settlements, Water and Sanitation) National Water Resource Strategy 2 (2013) (i.e. transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

4.4 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 4.3**) of coal power is expected to be decommissioned in the period 2030 to 2050. Therefore, additional capacity will be required from renewable energy sources, particularly solar with 6 000MW being allocated for the period up to 2030.

	Coal	Coal (Decommis-sioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1 860	2,100	2 912	1 474	1 980	300	3 830	499
2019	2,155	-2,373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1,433	-557				114	300			
2021	1,433	-1403				300	818			
2022	711	-844			513	400 1,000	1,600			
2023	750	-555				1000	1,600			500
2024			1,860				1,600		1000	500
2025						1000	1,600			500
2026		-1,219					1,600			500
2027	750	-847					1,600		2000	500
2028		-475				1000	1,600			500
2029		-1,694			1575	1000	1,600			500
2030		-1,050		2,500		1000	1,600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	

Figure 4.3: A snapshot of the updated 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 is therefore considered to support the Province/Region's generation targets. The Lichtenburg area is also considered as a hub for the development of solar energy projects due to the viability of the solar resource for the area and the number of projects proposed in the area.

The overarching objective for the solar energy facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. From a regional site selection perspective, this region is considered to be preferred for solar energy development by virtue of its annual solar irradiation values. The GHI for the area derived from the World Bank Group's Global Solar Atlas is approximately 2 143 kWh/m^2/annum, equivalent to the highest GHI values in the country (refer to **Figure 4.4**).

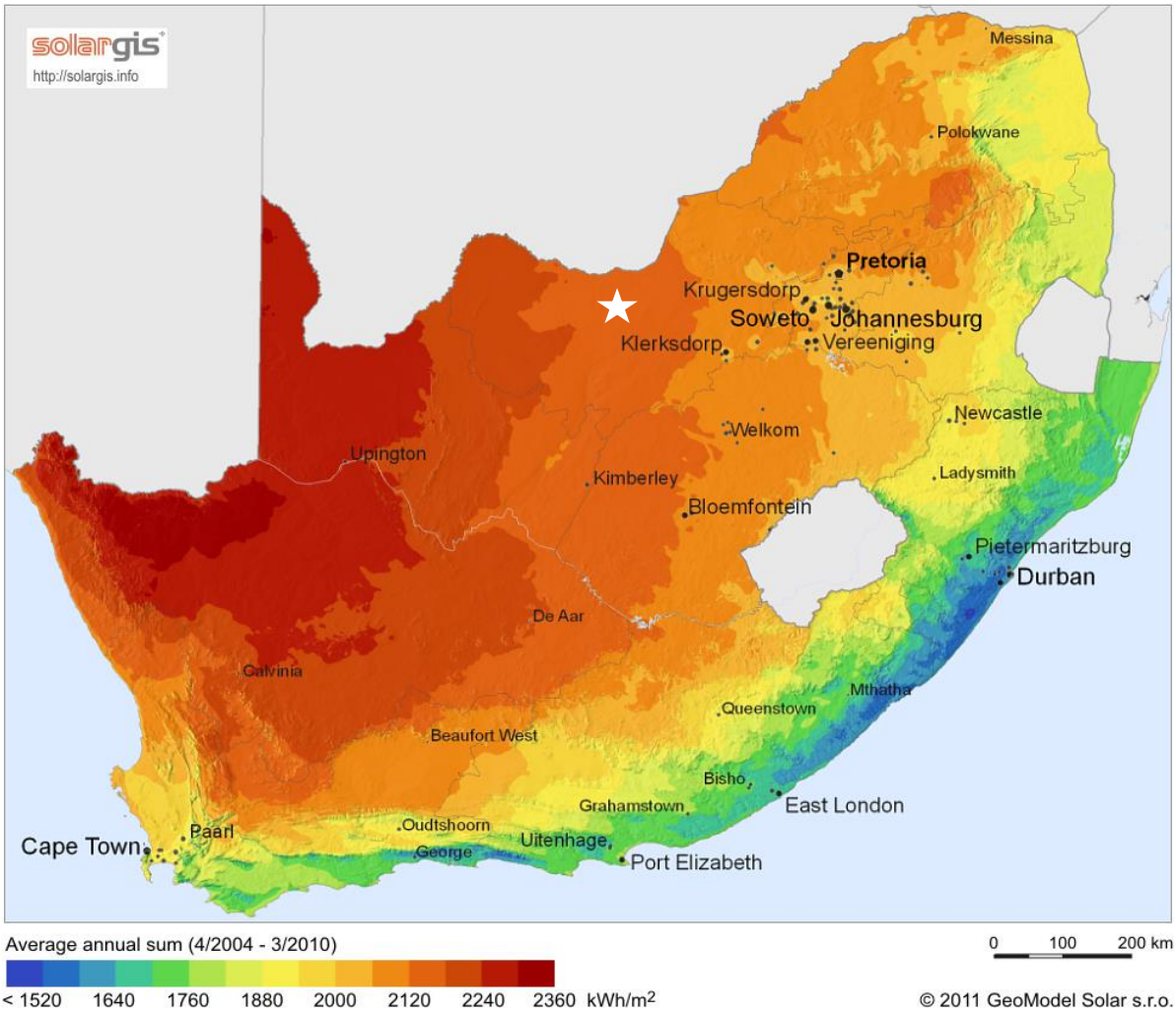


Figure 4.4: Solar irradiation map for South Africa, with the position of Dicoma PV shown by the white star (Source: GeoModel Solar)

4.5 Receptiveness of the proposed development area for the establishment of Dicoma PV

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. 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 due to the following site characteristics:

» **Solar resource**: The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values. The Global Horizontal Irradiation (GHI) for this geographic location is in the region of approximately 2 143 kWh/m²/annum, which is considered favourable for the development of a solar PV facility.

- **Topography**: 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 development area for Dicoma PV consists of a flat gently undulating topography, with slopes of less than 5% over most of the area, and with an average elevation of ~1500m above sea level. There are no prominent hills within the project site. 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 Dicoma PV.

- **Site extent and land availability:** Availability of relatively level land of sufficient extent can be a restraining factor to PV development, as a 75MW solar PV development and associated infrastructure requires sufficient land space. The development area, within which the project development footprint will be located, is ~ 179ha. This area is considered to be sufficient for the planned 75MW PV facility and provides an opportunity for the avoidance of sensitive environmental features and areas.

- **Access to Road Infrastructure and Site access**: The N14 national route provides access to the area from Upington, Pofadder, Springbok and Johannesburg. From the N14, the access point to the project site area will be via the existing R505 regional road and the main access to the site will be via an existing gravel District Road (D2435) Within the facility development area itself, access will be required from new / existing roads for construction purposes (and limited access for maintenance during operation). As material and components would need to be transported to the development area during the construction phase, accessibility to the project site is a key factor in determining the viability of Dicoma PV facility, particularly taking transportation costs (direct and indirect) into consideration and the impact of this on the project economics and the ability to submit a competitive bid under the DMRE's REIPPP Programme.

- **Grid access:** A key factor in the siting of any solar PV facility is that the project must have a viable grid connection in order to evacuate the generated electricity to the national grid. The grid connection point for Dicoma PV will be via a loop-in and loop out (LILO) overhead power line between the planned Eskom switching station and the existing Delareyville Munic– Watershed 1 88kV power line[14].to the south of the site. Having a grid connection point in close proximity to the project site (< 15km) reduces the necessary grid infrastructure and therefore addresses Eskom's concerns for lower cost connection alternatives. A shorter grid solution will also ensure that potential environmental impacts are kept to a minimum.

- **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 in the project site or directly adjacent to it which could be impacted upon by the proposed development. The proposed development is compatible with the surrounding land uses and does not present a conflicting land use.

[14] The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, and Dudfield-Watershed 1 88kV, and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

» **Landowner Support:** The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The landowner 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 property has been solidified by the provision of consent for the project to proceed on the property through the signing of a land option to lease agreement with the proponent.

Taking into consideration the solar resource, grid access, land suitability, landowner support, access to road infrastructure, the current land use of the project site and development area, in conjunction with other large-scale solar PV projects that have been authorised within the vicinity of the project site, the development of Dicoma PV is therefore considered to be desirable and will ultimately contribute to, and further develop the successful power generation activities already being undertaken within the area.

Therefore, the development of Dicoma PV within the project site and development area is considered to be desirable considering the characteristics of the area.

4.6 Benefits of Renewable Energy and the Need and Desirability

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

Socio-economic upliftment of local communities: Dicoma PV has the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. In terms of the needs of the local community, the Local and District municipality IDPs identified the need to facilitate economic development by creating an environment that is conducive for business development, economic growth, sustainable employment opportunities and growth in personal income levels of communities; unlock opportunities to increase participation amongst all sectors of society in the mainstream economy to create decent job opportunities; promote Local Economic Development; and enhance rural development and agriculture. A study undertaken by the Department of Mineral Resource and Energy (DMRE), National Treasury and the Development Bank of Southern Africa (DBSA) in June 2017 found that employment opportunities created during the construction phase of the projects implemented to date had created 40% more jobs for South African citizens than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned, confirming the potential benefits for local communities associated with the implementation of renewable energy projects.

Dicoma PV 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 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. As a result of the power constraints in the first half of 2015, power generators meant to be the "barely-ever-used" safety net for the system (diesel-fired gas turbines) were running at >30% average load factor in the first half of 2015. Load shedding occurred during 82 days in the first half of 2015 (out of 181 days). Results of a CSIR Energy Centre study for the period January to June 2015 (CSIR, August 2015), concluded that the already implemented renewable projects (wind and solar) within the country avoided 203 hours of so-called 'unserved energy'. During these hours the supply situation was such that some customers' energy supply would have had to be curtailed ('unserved') had it not been for the renewables. The avoidance of unserved energy cumulated into the effect that for 15 days, from January to June 2015, load shedding was avoided entirely, delayed, or a higher stage of load shedding prevented due to the contribution of renewable wind and PV projects[15]. More recently, power generated from renewable energy sources have assisted Eskom in alleviating the need for rolling blackouts when aging power stations have been offline for maintenance.

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

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

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

Economics: As a result of the available renewable energy resources and the competitive renewable energy procurement process, both wind power and solar PV power have now been proven as cheaper forms of energy generation in South Africa than fossil fuel (coal) generated power. The IRP 2019 gazetted by the Minister of Mineral Resources and Energy in October 2019, updates the energy forecast for South Africa from the current period until the year 2030 and has made an allocation of 6000MW in addition to the already installed/committed capacity of 2 288MW from solar PV facilities which will be developed from 2022 – 2030.

Pollution reduction: The release of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation. The use

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

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

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of GHG emissions. South Africa is estimated to currently be responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. Since its inception, the REIPPPP has achieved carbon emission reductions[16] of 25.3 million tonnes of CO_2 (IPP Office, March 2018). The development of Dicoma PV, 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 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. In the short 8-year period, the REIPPPP has attracted R209.4 billion in committed private sector investment, resulting in 38 701 jobs for the youth and women from surrounding communities[17].

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. The development of renewable energy facilities contributes to the protection of the foundations.

4.7 Alternatives Considered during the EIA Process

In accordance with the requirements of Appendix 2 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. Several other solar renewable energy facilities are planned within the broader study area, supporting the suitability of the area for solar PV projects.

[16] Carbon emission reduction is calculated based on a displacement of power, from largely coal-based to more environmentally friendly electrical energy generation, using a gross Eskom equivalent emissions factor of 1.015 tons CO_2/MWh.

[17] https://www.sanews.gov.za/south-africa/renewable-energy-programme-attracts-r2094-billion-sa-economy

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

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

In this instance, 'the project' refers to Dicoma PV, a solar PV facility with capacity of up to 75MW$_{AC}$ and associated infrastructure proposed to be developed by an Independent Power Producer (IPP) and intended to form part of the DMRE's REIPPP Programme.

4.7.1 Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level and, as a result, project specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the DMRE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP)[18], 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. Therefore, fundamentally different alternatives to the proposed project are not considered within this EIA process.

4.7.2 Consideration of Incrementally Different Alternatives

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

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

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

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

i. <u>Property or Location Alternatives</u>

The placement of a solar PV facility is dependent on several other factors including land suitability, climatic conditions (solar irradiation levels), topography, the location and extent of the study area, availability of grid connection infrastructure and the need and desirability of the project. Dicoma PV (Pty) Ltd as the Applicant,

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

considers the preferred development area placed within the study area as being highly favourable and suitable for the establishment of a solar PV facility.

Based on those site-specific attributes discussed in Section 4.5, the Applicant considers the development area located within the study area as highly preferred in terms of the development of a solar PV facility. The project site is within a developing hub of renewable energy project, and the Dicoma PV facility will be able to draw on synergies with the projects proposed and/or currently authorised within the vicinity of the study area. As a result, no property/location alternatives have been assessed further as part of this EIA process.

ii. Design and Layout Alternatives

The affected property (i.e. Portion 1 of the Farm Houthaalboomen 31, Portion 9 of the Farm Houthaalboomen 31 and Portion 10 of the Farm Houthaalboomen 31) is approximately 552ha in extent, which is sufficient for the installation of a solar PV facility with a contracted capacity of up to 75MW, while allowing for the avoidance of environmental site sensitivities. A development area of ~179ha has been identified within the project site within which the solar PV facility will be located. The development footprint for the Dicoma PV array plus associated infrastructure will be located) has been demarcated as an area of ~175ha.

Areas to be avoided that were identified during the scoping phase, have been utilised as a tool by the developer to identify and locate the development area of the PV facility with a contracted capacity of 75MW within the development area of 179ha. 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.

The site extent is sufficient for the proposed development and therefore reduces the need to consider alternative locations for the PV facility and the associated infrastructure. Potential environmentally sensitive areas that have been identified as part of the Scoping Phase have been further considered within this EIA Phase. The environmental sensitivity identification process informed the layout design for the PV facility, avoiding sensitive areas as far as possible, and thereby ensuring that the layout plan taken forward for assessment during the EIA Phase is considered to be the most optimal from an environmental perspective.

» *Grid Connection Alternatives*

Two alternative LILO grid connection corridors have been considered for the establishment of the Dicoma PV Facility:

Grid Connection Alternative 1: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other approximately 1.3km east of the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV[19] . The grid connection infrastructure is located within an assessment corridor 100m in width.

19 The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

Grid Connection Alternative 2: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other and infringes on the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV. The grid connection infrastructure is located within an assessment corridor of 100m in width.

Both alternatives are considered and assessed in this EIA report (refer to Chapter 7) in order to determine the most optimal grid connection option from an environmental perspective.

4.7.3 Technology Alternatives

4.7.3.1 PV Technology Alternatives

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

Solar PV was determined as the most suitable option for further assessment. The 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 and consists of a lower visual profile and limited water requirements when compared to the CSP technology alternative. Given the allocations in the IRP (2019), solar PV is considered as the most appropriate technology option. Furthermore, the development of the Dicoma PV facility provides an opportunity to optimally use a site that was previously earmarked for energy generation through making use of solar PV technology (with projects previously authorised on this footprint).

Therefore, considering the above, no other technology alternatives are being assessed for the development of Dicoma PV. 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 remain similar in magnitude. Fixed mounted PV systems are able to occupy a smaller extent and have a lower height when compared to tracking PV systems, which require both a larger extent of land, and are taller in height. However, both options are considered to be acceptable for implementation from an environmental perspective. Bifacial solar PV panels offer many advantages over monofacial PV panels, as power can be produced on both sides of the module, increasing total energy generation. The preference will therefore be determined on the basis of technical considerations and the site conditions.

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

4.7.3.2 Battery Energy Storge System (BESS) technology alternatives

The general purpose and utilisation of a Battery Energy Storage System (BESS) is to save and store excess electrical output as it is generated, allowing for a timed release when the capacity is required. BESS systems therefore provide flexibility in the efficient operation of the electric grid through decoupling of the energy supply and demand. **Figures 4.5, 4.6, 4.7** and **4.8** below illustrate a typical utility scale BESS system (a Lithium-Ion BESS) as applied in the context of a renewable energy facility.

Figure 4.5: Li-Ion BESS implementation for a Renewable Energy facility (Source: Enel Green Power).

Figure 4.6: Li-Ion BESS containerised modules located within the BESS enclosure footprint (Source: Enel Green Power).

Figure 4.7: Li-Ion BESS internal design and implementation of a container used within a BESS. The image shows a series of sealed battery cell packs within a containerised module (Source: Enel Green Power).

Figure 4.8: Illustration of battery storage units installed by Tesla (Source: fastcompany.com).

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are considered:

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

Considering the nature of the project, only a solid-state technology type would be envisaged for implementation. The technology includes batteries housed within containers which are fully enclosed and self-contained. Therefore, the assessment proposes all solid-state technologies for authorisation to allow the proponent to determine the precise technology when the project is implemented, on the understanding that further investigation into the specific technologies available at the time of being awarded preferred bidder status will allow for one of two to be selected and ultimately developed.

4.7.3.2.1 Compliance to local and international standards and Fire Prevention

The BESS will be compliant with all local laws and regulations and health and safety requirements governing battery facilities. Over and above that they will comply with international standards such as UN 38.3 (Transportation Testing for Lithium Batteries), UL 1642 (Standard for Safety – Lithium-ion Batteries) and IEC 62619 (Secondary cells and batteries containing alkaline or other non-acid electrolytes Safety requirements for secondary lithium cells and batteries, for use in industrial applications). Furthermore, the battery facility will also comply with standards such as UL 1973 (Batteries for Use in Stationary Applications) and IEC 62619-2017 including thermal runaway non-propagation and safety zone region operation limits and a failure mode analysis. The design will be compliant with UL 9540 (Energy Storage Systems and Equipment): this standard defines the safety requirements for battery installation in industrial and grid connected applications.

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

Figure 4.9 below provides a typical configuration of fire detection and suppression system.

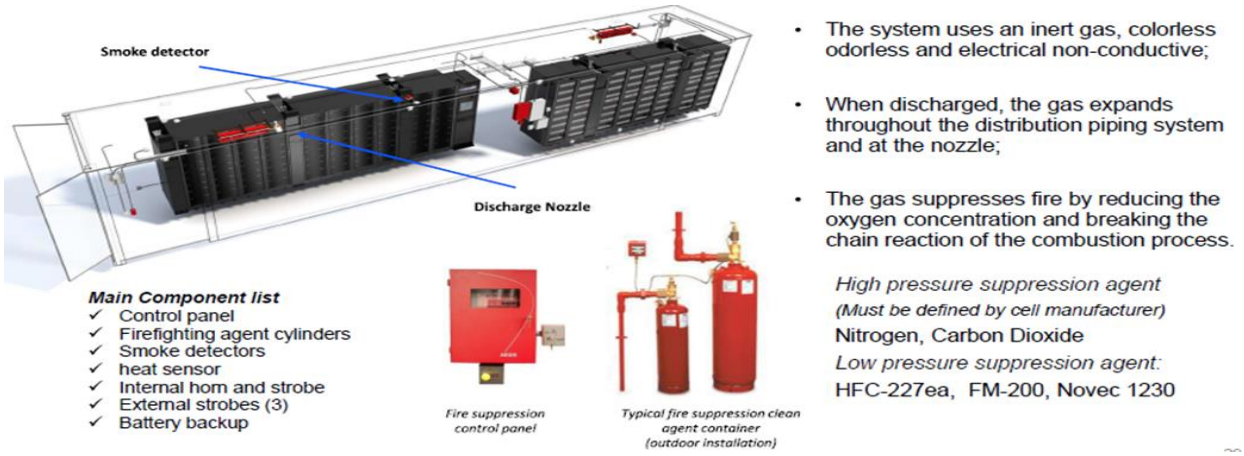


Figure 4.9: Typical configuration of fire detection and suppression system

4.7.4 The 'Do-Nothing' Alternative

The 'Do-Nothing' alternative is the option of not constructing the Dicoma PV 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 associated with renewable energy development, although it is expected that pressure to develop the site for renewable energy purposes will be actively pursued due to the same factors which make the site a viable option for renewable energy development. The current land use practices would continue, and the past and current grazing pressures on the environment will continue. The 'do-nothing alternative has been assessed as part of the EIA Phase (refer to **Chapter 7** and **Chapter 9** of this draft EIA Report).

CHAPTER 5: APPROACH TO UNDERTAKING THE SCOPING/EIA PROCESS

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 Dicoma PV 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 75MW and Activity 1 of Listing Notice 2 (GNR 325).

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**. This chapter outlines the process that was followed during the Scoping and EIA Phases.

The Scoping and EIA process is illustrated in **Figure 5.1**.

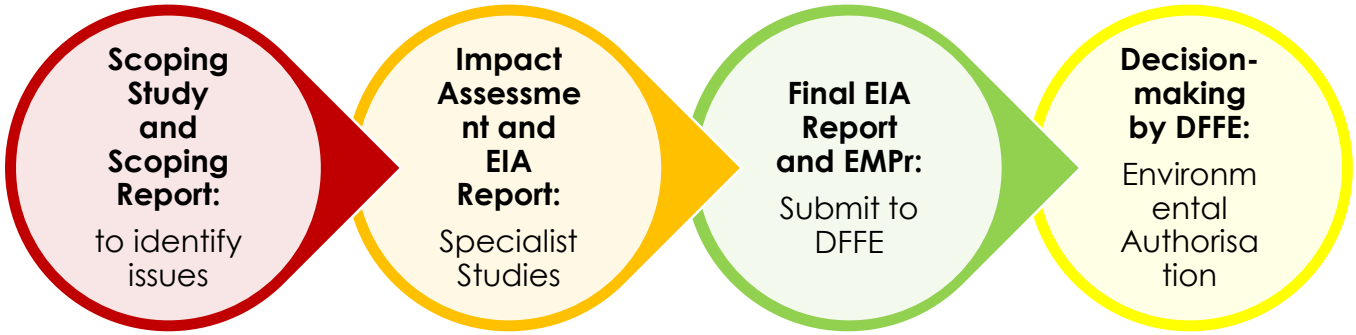


Figure 5.1: The Phases of an Environmental Impact Assessment (EIA) Process

South Africa is subject to the enforcement of Government Gazette 43096 which places the country in a national state of disaster limiting the movement of people to curb the spread of the COVID-19 virus. Considering the limitations in place, a comprehensive consultation process was designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which included 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.

5.1 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 Environmental Impact Assessment Report:

Requirement	Relevant Section
(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for and (ii) a description of the associated structures and infrastructure related to the development.	All listed activities triggered and applied for are included in **Section 5.2**, **Table 5.1**. The specific project activity relating to the relevant triggered listed activities has also been included in Table 5.1.
(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The public participation plan was prepared and approved by the DFFE (**Appendix C1**). The public participation process followed throughout the EIA process of Dicoma PV is included in **Section 5.5.2** and copies of the supporting documents and inputs are included in **Appendix C**.
(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	All comments received from the commencement of the EIA process have been included and responded to in the Comments and Responses (C&R) Report (**Appendix C9**). All comments raised during the 30-day review and comment period of the EIA Report and through on-going consultation with I&APs will be included and responded to as part of a C&R report (**Appendix C9)** to be submitted as part of the Final EIA Report to DFFE for decision-making.
(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives are included in **Section 5.5.3**.

5.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to Dicoma PV, 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 5.5**.

5.2.1 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 Dicoma PV facility is a power generation project and therefore may relate 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 Dicoma PV 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 5.1 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 Dicoma PV facility and associated infrastructure, and for which an application for EA has been made:

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

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV or more. ***33kV cabling, 132kV facility substation, 132kV Eskom switching station, and Loop-in-Loop out 132kV power lines are proposed to connect Dicoma PV to the Eskom electricity grid. The site falls outside an urban area.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	14	The development and related operation of facilities and infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. ***The development of the Dicoma PV facility will require the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the on-site substations 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 projects and will be up to 8m.***
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:

Notice Number	Activity Number	Description of listed activity
		(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 agricultural use.***
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 Dicoma PV facility will have a contracted capacity of 75MW.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended)	15	The clearance of an area of 20ha or more of indigenous vegetation[20]. ***Dicoma PV 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)	**4 (iv)**	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **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 infrastructure will require the development of access and internal roads wider than 4m within ESA areas.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	**10 (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; ***The development of the PV facility and associated infrastructure will require the storage and handling of a dangerous good with a capacity of 80 cubic meters within ESA areas.***

[20] "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
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	**12 (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 infrastructure will require the clearance of more than 300 square meters of indigenous vegetation within areas classified as ESA.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended)	**18 (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 renewable energy facilities and associated infrastructure may require the widening of a road by more than 4 metres, outside urban areas and within areas classified as ESA.***

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

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

In terms of the NFEPA (2011) and the NBAs 2018 National Wetlands Map 5 no wetlands or watercourse features are located within the project site as well as within the 500m regulated area of a wetland. It has been concluded that no surface freshwater resource features will be impacted by the Dicoma PV facility development and as such further assessments relating to the freshwater resource features are not necessary during this EIA Phase.

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

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

<u>Section 38: Heritage Resources Management</u>

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).

5.3 Overview of the Scoping Phase

The Scoping Phase aimed to:

» Identify, describe and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed facility (including design, construction, operation and decommissioning) within the site through a desk-top review of existing baseline data and desk-top specialist studies.
» Identify potentially sensitive environmental features and areas within the broader site in order to inform the design process of the facility.
» Define the scope of studies to be undertaken within 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 process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

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 location.
» Identify and confirm the preferred project and technology alternative.
» Identify and confirm the preferred site.
» Identify the key issues to be addressed in the EIA phase.
» Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the

impacts and risks the project will impose on the preferred site through the life of the project, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site.

» 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.

The broader project site was considered during the Scoping Study for the 75MW for the Dicoma PV facility to identify and delineate any environmental fatal flaws, "no-go" or sensitive areas which should be avoided. The preparation and release of the Scoping Report for a 30-day public review period provided stakeholders and I&APs with an opportunity to verify that the comments they had raised during the Scoping process had been captured and adequately considered and provided a further opportunity for additional key comments to be raised for consideration. The Final Scoping Report and Plan of Study for EIA was submitted to DFFE on 26 November 2021, and acceptance was received on 02 February 2022 (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 this EIA Report in **Table 5.2.**

Table 5.2: DFFE requirements and reference to Section in the EIA Report

DFFE Requirement for EIA:	Response / Location in this EIA Report:
a) Listed Activities 1. The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	All relevant listed activities applied for are specific and can be linked to the development activity or infrastructure as described in the project description. .
2. If the EIAr contains listed activities and/or other information that differs from the application form, the application form must be amended accordingly and submitted to the Department with the EIAr.	An amended application is not required as the listed activities represented in the EIAr do not differ from those in the application form.
3. The EIAr must assess the correct sub listed activity for each listed activity applied for.	The EIAr assessed the correct sub-listed activity for each listed activity applied for, as per the application form.
4. Please Indicate that the final assembling of the battery energy storage system (BESS) for one of the two alternatives discussed in the FSR, triggers activity 14 of Listing Notice 1 or not, when submitting the EIAr,	The batteries will be assembled prior to being transported to site; therefore Activity 14 of Listing Notice 1 is not applicable to the BESS.
Alternatives 5. The Do-Nothing" alternative must discuss both negative as well as positive impacts of this alternative	The potential positive and negative impacts of the Do-Nothing alternative is assessed in Chapter 7 of the EIAr
6. The Department acknowledge the alternative discussion of the BESS from page 60 to 62, and the BESS compliance standards, and fire prevention on page 63 of the FSR, however in the EIAr please provide the Risk Assessment of the chosen proposed alternative of the BESS with detailed identified impacts and mitigation methods.	A Risk Assessment of the preferred BESS technology is provided in Chapter 7 of the EIAr.
Coordinates 7. The EIAr must provide the four corner coordinate points for the proposed development site of the Setaria PV facility, (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 proposed development site.	Coordinates of the project site are listed in Table 1.1 and Appendix O of the EIAr
8. Please provide the coordinates of the 33kV MV cabling, 132kV facility substation, 132kV Eskom switching station, and Loop-in Loop-out 132kV power line proposed	Coordinates of the grid connection corridor are listed in Table 2.1 and Appendix O of the EIAr

DFFE Requirement for EIA:	Response / Location in this EIA Report:
to connect Dicoma PV to the Eskom electricity grid in the DEIAr	
9. Please also provide the coordinates of the battery energy storage system in the DEIAr.	The BESS is forms part of the BESS, Construction and O&M hub. Centre coordinates of the hub is listed in Table 2.1 and Appendix O of the EIAr
Public Participation 10. You are required to state where the DEIAr was kept/ how it was distributed for public review and comment, as well as the period it was kept for.	Details of the distribution and commenting period of the EIAr available for public review are included in Chapter 5, Section 5.4.2
11. Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. This includes but is not limited to North West Department of Economic Development, Environment, Conservation and Tourism, Small Business Development, Tourism and Environmental Affairs; Department of Agriculture, Forestry & Fisheries; DItsobotia Local Municipality; Ngaka Modirf Molema District Municipality, SANRAL, Bird Life SA, SAHRA, Eskom, Department of Water and Sanitation (DWS), and DFFE: Directorate Biodiversity and Conservation,	All comments received during the public participation process and those submitted on the EIAr 30-day review and comment period are included in the C&RR (included as Appendix C9 of the EIAr), and have been responded to, as required.
12. Please ensure that all issues raised and comments received during the circulation of the draft SR and draft EIAr from registered I&APs and organs of state which have jurisdiction In respect of the proposed activity are adequately addressed in the final EIAr. Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	Proof of correspondence with the various stakeholders and proof of attempts to obtain comments from the stakeholders on the project database are included in Appendices C5 and C6 of the EIAr.
13. A Comments and Response trail report (C&R) must be submitted with the final EIAr. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as Indicated in Appendix 1 of this comments letter. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as toted' is not regarded as an adequate response to I&AP's comments.	The C&RR is attached as a separate document in Appendix C9 of the EIAr. Written comments received have been captured verbatim and not summarized and responded to as applicable. Following the review and comment period of the EIAr, all written responses received will be included in the C&RR to be appended to the final EIAr for submission to DFFE.
14. Comments from I&APs must not be split and arranged Into categories. Comments from each submission must be responded to Individually.	Comments received have been captured by date order in the C&RR, and have been responded to individually.
15. The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations, 2014, as amended.	The Public Participation Process has been conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended (GNR 326), as well as in accordance with the approved Public Participation Plan (Appendix C1).

DFFE Requirement for EIA:	Response / Location in this EIA Report:
16. The EAP is requested to contact the Department to make the necessary arrangements to conduct a site inspection prior to the submission of the final EIAr.	The necessary arrangements will be made within the Department to conduct a site visit prior to the submission of the final EIAr.
Layout & Sensitivity Maps 17. The EIAr must provide the following: Clear indication of the envisioned area for the proposed solar energy facility; i.e. location of solar PV, internal roads, powerlines, fencing, Battery Energy Storage System (BESS), and all associated infrastructure should be mapped at an appropriate scale. Clear description of all associated infrastructure. This description must include, but is not limited to the following: • Internal roads infrastructure; and; • All supporting onsite infrastructure such as laydown area, guard house and control room etc. All necessary details regarding all possible locations and sizes of the proposed satellite substation and the main substation.	The technical details of the facility and associated infrastructure are listed in a table format in Table 2.1 in Section 2 of the EIAr. A Layout map illustrating all facility infrastructure is included as Figure 2.1 in the EIAr.
18. A copy of the final preferred route layout map which include the PV facility and all associated infrastructure must be submitted with the Draft EIAr. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following: • Permanent laydown area footprint; • Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); • Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; • The location of sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; • Substation(s) and/or transformer(s) sites including their entire footprint; • Location of access and service roads; • All existing infrastructure on the site, especially railway lines and roads; • Buffer areas; • Buildings, including accommodation; and • All "no-go" areas.	A copy of the final preferred layout and sensitivity maps have been included in Chapter 9, and Figure 9.2 of the EIAr. The A3 maps have been included in Appendix O of the EIAr. The facility layout responds to identified sensitivities, and a preferred layout has been provided for the facility considering environmental and technical limitations.
19. An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	An Environmental Sensitivity Map which includes the location of the sensitive environmental features identified on the site, buffer areas and no-go areas is included in Figure 9.1 in the EIAr and the maps have also been included in Appendix O of the EIAr.

DFFE Requirement for EIA:	Response / Location in this EIA Report:
20. A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	A map which combines both the facility layout and location of the sensitive environmental features on the site, buffer areas and no-go areas is included in Figure 9.2 of the EIAr. Maps have also been included in Appendix O of the EIAr.
Specialist assessments 21. The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: • A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisations. • 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. • Regarding cumulative impacts: o 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. o 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. o Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used In the process.	Each Specialist study provides an outline of their terms of reference with their report. The following is included in the specialist reports (Appendices D to J): • a complete project description as well as methodology used to assess the project impacts. • detail of any applicable study limitations relevant to the study (limitations and assumptions of the EIA are also included in Chapter 5). • No-go areas • detailed/practical mitigation measures for the preferred alternative and recommendations authorisation • Assessment of alternatives, and nomination of preferred alternative (where relevant). The Department's consideration of a no-go area is noted in that no development is permitted within all areas demarcated as a 'no-go' area. No-go areas have been demarcated within the assessed development footprint. In response to the identified need to adequately manage impacts within sensitive areas identified on the site development footprint, and in order to demonstrate the commitment of the project to adhere to recommended mitigation measures, the project Applicant has developed a best practice mitigation strategy with regards to the facility layout. Specific specialist mitigation measures are included in the EIAr and specifically the EMPrs (refer to Appendices K to M of the EIAr). Cumulative Impacts were assessed in detail in Chapter 8 of the EIAr. The assessment considered projects within a 30km radius of the proposed development site. Identified cumulative impacts are clearly defined, described and assessed in the Cumulative Impacts chapter. Where possible, the extent of the identified impacts has been quantified and indicated. The cumulative impacts significance rating informed the need and desirability of the proposed development. A cumulative impact environmental statement on whether the proposed development must proceed has also been included in Chapter 9 of the EIAr.

DFFE Requirement for EIA:	Response / Location in this EIA Report:
o The significance rating must also Inform the need and desirability of the proposed development. o A cumulative impact environmental statement on whether the proposed development must proceed.	
22. 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.	During our review of the specialist reports Savannah Environmental did not identify recommendations that contradict one another, therefore the most reasonable recommendations have been presented in the EIAr.
23. The following Specialist Assessments will form part of the EIAr: • Ecology • Avifauna • Soils • Visual • Heritage • Social	The listed specialist studies are included in Appendix D to I of the EIAr. A Traffic Impact Assessment is also included as Appendix J.
Construction and Operational EMPr 24. A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAr.	An EMPr containing both construction and operational mitigation and monitoring measures is included as Appendix L of the EIAr.
25. The EMPr must be developed in terms of Appendix 4 of the EIA Regulations, 2014 as amended and must include (but not limited to) the following plans and measures: • Re-vegetation and habitat rehabilitation; • Alien invasive management; • Traffic management • Noise management; • Stormwater management; • Emergency Response; • Fire Management; • Erosion management; • Dust management; and, • All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted. • An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	The EMPr for the PV facility has been compiled in accordance with the requirements of Appendix 4 of the EIA Regulations, 2014 (as amended). The following appendixes are included as part of the EMPr (refer to Appendix K of the EIAr): • Grievance Mechanism for Public Complaints and Issues • Alien Plant Management Plan • Plant Search and Rescue Plan • Storm Water Management Plan • Waste Management Plan • Traffic Management Plan • Emergency Preparedness, Response and Fire Management Plan • Chance Find Procedure
26. The EMPr must not contain any ambiguity. Where applicable, statements containing the word °should° or °may° are to be amended to °must°.	The EMPr has been drafted to include clear management measures.

DFFE Requirement for EIA:	Response / Location in this EIA Report:
27. The EMPr must distinguish between impact management actions and impact management outcomes.	The EMPr distinguishes between impact management actions and impact management outcomes.
28. The EMPr must also include the frequency for auditing of compliance with the conditions of the EA and EMPr, and for the submission of such compliance reports to the competent authority	The EMPr includes the frequency for auditing
Generic EMPr 29. For the proposed development of the 33kV MV cabling, 132kV facility substation, 132kV Eskom switching station, and Loop-inLoop out 132kV power line, triggers Activity 11 of Listing Notice 1 of NEMA EIA Regulations, 2014, as amended. The following generic EMPr must be included as part of the EIAr: • Generic EMPr for the development and expansion of substation infrastructure for the transmission and distribution of electricity • Generic EMPr for the development end expansion for overhead electricity transmission and distribution Infrastructure.	Generic EMPrs for the 132kV power line and substation infrastructure have been included in Appendix L and Appendix M respectively.
30. This generic EMPr can be downloaded from the following link httos://www.envlronment.00v.zaidocumentsliorms.	the Generic EMPr in Appendix xxx has made use of the document available at the provided link.
31. Part B: Section 2 of the generic EMPr must be completed, and a copy of an originally signed EMPr must be submitted with the final BAR. Please note that Point 7.1.1 in Part B: Section 2 needs to match the details of the applicant as contained in the application form.	Applicant details as per the application form are included Point 7.1.1 in Part B: Section 2 of the Generic EMPrs (refer to Appendix L and Appendix M)
32. If any specific environmental sensitivities/attributes are present on the site which require more specific Impact management outcomes and impact management actions, not included In the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions must be included in section C of the generic EMPr	Specific environmental sensitivities are included in Section C of the Generic EMPrs (refer to Appendix L and Appendix M)
General 33. The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under Annexure 2 below.	The technical details of the facility and associated infrastructure are listed in a table format in Table 2.1 in Section 2 of the EIAr.
34. 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.	Section 2.6.4 of the EIAr provides details on the decommissioning of the facility. The future plans for the site beyond 20 years will depend on whether the power purchase agreement (PPA) (valid for a minimum of 20 years) can be extended. If it can, the infrastructure will be assessed for reliability and efficiency and upgraded accordingly. If not, then the plant will be decommissioned and rehabilitated . Infrastructure will be remove and recycled or repurposed where possible.
35. Should a Water Use License be required, proof of application for a license needs to be submitted?	A water use authorisation will not be required in terms of 21(c) and(i) as there are no watercourse located within 500m of the project site. Applicability of 21(a) for water

DFFE Requirement for EIA:	Response / Location in this EIA Report:
	supply is yet to be determined but will most likely be sourced from municipal water supply. Requirements of the Department of Human Settlements, Water and Sanitation is for a water use authorisation for energy projects to obtained once a positive EA is obtained and the project selected as preferred bidder since, development of energy projects is dependent on preferred bidder status.
36. The EAP must provide landowner consent for all farm portions affected by the proposed project, whether the project component Is linear or not, i.e. all farm portions where the access road, solar panels and associated infrastructure is to be located.	The landowner consent for the farms Portion 1, Portion 9, Portion 10 of the Farm Houthaalboomen 31 are included in the Application form as submitted, covers the PV facility and associated infrastructure components, including the gridline. In terms of Section 39(2)(a) of the EIA Regulations, GN 326 of 2017, as amended, landowner consent is not required for linear activities. The landowners on the farm portions of affected by other linear infrastructure for the Setaria PV facility are all included as part of the registered I&APs for the project (refer to Appendix C2 of the EIAr).
37. A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAr.	The required EMPrs are included in Appendix K to M of the EIAr.
The applicant is hereby reminded to comply with the requirements of Regulation 45 of GN R982 of 04 December 2014, as amendment, with regard to the time period allowed for complying with the requirements of the Regulations.	The EIAr process complies with the prescribed timeframes requirements.
You are requested to submit one (1) full colour hard copy of the Environmental Impact Assessment Report (EIAR) to the Department and at least one electronic copy (USB) of the complete final report with the hard copy documents.	Documents are loaded onto the Department's SFiler Pproof of upload in the form of a screenshot will be sent to EIAApplications@dffe.gov.za.
You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.	The Applicant acknowledges that no activity may commence prior to receipt of the Environmental Authorisation.

5.4 Overview of the EIA Phase

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

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context.
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted Scoping Report.
- Identify the location of the development footprint within the approved site as contemplated in the accepted Scoping Report based on an impact and risk assessment process inclusive of cumulative

impacts and a ranking process of all the identified development footprint alternatives 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
    - Can be avoided, managed or mitigated
- Identify the most ideal development footprint for the activity within the development envelope of the approved 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.

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

Consultation with relevant authorities has been undertaken during the Scoping Phase and has continued throughout the EIA process. To date, this consultation has included the following:

- Submission of a Pre-Application Meeting request with DFFE on 23 September 2021 and the proposed Public Participation Plan. Following submission of the PP Plan, the DFFE provided approval of the submitted PP Plan via email on 29 September 2021, and 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.
- Submission of the Scoping Report for review and comment on 15 October 2021 to 15 November 2021, and submission of the Final Scoping report on 26 November 2021.
- Receipt of the Acceptance of Scoping on 02 February 2022

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

- Make the EIA Report available for a 30-day public and authority review period.
- 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 period to prepare a Final EIA Report.
- Submission of the Final EIA Report to DFFE for decision making.
- Provide an opportunity for DFFE and NW DEDECT representatives to visit and inspect the proposed site and project area.

The submissions, as listed above, are to be undertaken electronically, as required by the DFFE (in line with the directions for new Applications for Environmental Authorisations provided for in GNR650 of 05 June 2020).

A record of all authority correspondence undertaken during the Scoping/EIA process is included in **Appendix B** and **Appendix C5**.

5.4.2 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 Dicoma PV has been run in tandem with the public consultation for Dicoma PV and Dicoma PV, located in close proximity to the site. The benefit to the stakeholder is that all information relevant to all related applications has been made available for review together, and not only for comments to be raised across the three applications at one time, but also provided a complete picture of the potential for impacts and/or benefits related to the suite of projects located in close proximity to one another.

The Public Participation Process undertaken for Dicoma PV considers the restrictions and limitations imposed by Government through section 27 (2) of the Disaster Management Act (Act No. 57 of 2002) of 2002 and the Directions issued by the Minister of Forestry and Fisheries (DFFE) in terms of consultations with I&APs. A Public Participation Plan was prepared and submitted to DFFE for approval. Approval of the Plan was provided by the DFFE Case Officer via email on 29 September 2021 (**Appendix B**).

The alternative means of undertaking consultation have 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 Public Participation Plan (**Appendix C**) considers the limitations applied by the Disaster Management Act Regulations prohibiting the gathering of people, as well as limitations which certain I&APs may have in terms of access to computers and internet as well as access to public spaces currently not open for operation that inhibits access to hard copy documentation. The online stakeholder engagement platform implemented by Savannah Environmental for the project allowed the EAP to visually present details regarding the project as well as consultation documentation, including project maps and plans. The platform also contains the Scoping Report available for review. The use of an online tool enables stakeholders and I&APs to explore the project-specific content in their own time, and still enables them to participate in a meaningful way in the consultation process.

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

» During the **Scoping Phase**:

- provide an opportunity to submit comments regarding the project;
- assist in identifying reasonable and feasible alternatives, where required;
- identify potential comments 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 comments of concern and suggestions for enhanced benefits.

» During the **EIA Phase**:
- contribute relevant local information and knowledge to the environmental assessment;
- verify that comments 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**:
- Notify I&APs of the outcome of the competent authority's decision, and the timelines for appealing the decision.

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

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks are required to be undertaken:
» Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
  (i) the site where the activity to which the application relates is or is to be undertaken; and
  (ii) any alternative site mentioned in the application.
» Give written notice to:
  (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;

(v) the municipality which has jurisdiction in the area;
(vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
(vii) any other party as required by the competent authority.

» Place an advertisement in a local newspaper.
» Open and maintain a register of I&APs and Organs of State.
» Release of a Scoping/EIA Report for a 30-day review and comment period.
» Prepare a Comments and Responses (C&R) report which documents the comments received on the Scoping/EIA process and during the 30-day review and comment period of the Scoping/EIA Report and the responses provided by the project team.

In compliance with the requirements of Chapter 6: Public Participation of the EIA Regulations, 2014 (as amended), and the approved Public Participation Plan, the following summarises the key public participation activities implemented. The schematic below provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation.

i. Stakeholder identification and register of I&APs	•Register as an I&AP on the online platfrom via completion of a form and provison of contact information, by responding to an advert, or sending a 'please call me' which will be responded to •State interest in the project •Receive all project related information via email
ii. Advertisments and notifications	•Advertisements, site notices and/or radio live reads and notifications provide information and details on where to access project information •Notifications regarding the EIA proceses and availability of project reports for public review to be sent via email, post or SMS notifications
iii. Public Involvement and consultation	•Distribution of a BID providing details on the project and how I&APs can become involved in the process •Submission of comments or queries via the online platform to the PP team •Availability of project information via the online platform •An opportunity for I&APs and stakeholders to request virtual meetings with the project team. •Direct in-person consultation will only take place in limited numbers and where sanitary conditions can be maintained at all times.
iv. Comment on the Scoping and EIA Reports	•Availability of the project reports via the online platform for 30-day comment period •Submission of comments via the online platform, email or post to the PP team •Comments recorded and responded to, as part of the process
v. Identification and recording of comments	•Comments and Responses Report, including all comments received, and included within the final Report for decision-making

i. Stakeholder identification and Register of Interested and Affected Parties

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

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the

greater surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders are required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via phone, text message (SMS and WhatsApp), email or fax, or registering their interest via the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is listed in **Table 5.3**.

Table 5.3: List of Stakeholders identified for the inclusion in the project database during the public participation process for Dicoma PV facility

Organs of State
National Government Departments
Department of Forestry, Fisheries and the Environment (DFFE)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture, Land Reform, and Rural Development (DALRRD:
Department of Human Settlements, Water and Sanitation
Department of Communications
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
Telkom SA SOC Ltd
Provincial Government Departments
North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT)
North West Department of Public Works and Roads (NW DPWR)
North West Provincial Heritage Resources Agency (NW PHRA) – provincial Heritage Authority
North West Department of Community Safety and Transport Management (NW DCSTM)
Local Government Departments
Ngaka Modiri Molema District Municipality
Ditsobotla Local Municipality – including the Ward Councillor, ward committee members, community representative or local community forum members
Commenting Stakeholders
BirdLife South Africa
Endangered Wildlife Trust (EWT)
Wildlife and Environment Society of South Africa (WESSA)
North West Department of Agriculture and Rural Development (NWDARD)
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names[21] of:

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

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

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

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

- A letter advising registered parties of the Acceptance of Scoping received from DFFE and the availability of the EIA process distributed on 03 February 2022.
- Notification letter distributed to all registered parties advising them of the availability of the EIA Report for review and comment on 03 January 2022
- An advertisement announcing the availability of and inviting comment on the EIA Report in the Noordwester Local newspaper on 03 February 2022. The tearsheet of the newspaper advert will be included in **Appendix C2** of the Final EIA Report.
- The EIA Report has been made available for review by I&APs for a 30-day review and comment period from 07 February 2022 – 09 March 2022. The EIA Report has been made available on the Savannah Environmental website and all registered I&APs have been notified of the availability on 03 February 2022 via email which included the link to access the report on the Savannah Environmental website. The evidence of distribution of the EIA Report will be included in the final Report, which will be submitted to DFFE. I&APs have been encouraged to view the EIA Report and submit written comment. The EIA Report has been circulated to Organs of State via electronic transfer (Dropbox, WeTransfer, etc), or CD and/or hardcopy as per individual request. The evidence of distribution of the EIA Report has been included in this EIA Report (refer to **Appendix C**).

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, and concerns regarding the project, various opportunities have been provided to I&APs to note their comments. I&APs are being consulted through the following means:

- Opportunity for review of the EIA report for a 30-day period from 07 February 2022 – 09 March 2022. Comments received during this review period will be captured in within a Comments and Responses Report, which will be included within the Final EIA Report.
- Focus group meetings: Virtual focus group meetings will be held with key government departments, stakeholders and landowners during the scoping phase of the process. The purpose of these focus group meetings is to provide an overview of the findings of the EIA studies in order to facilitate comments on the EIA process and Scoping Report, as well as to record any comments or concerns raised by stakeholders regarding the project. As per the approved public participation plan, these meetings will

be held via virtual platform. The minutes of these meetings will be included in the final EIA Report for review and decision making by the DFFE.
» One-on-one consultation meetings for example with directly affected or surrounding landowners. As per the approved public participation plan, these meetings will be held via virtual platform.
» Telephonic consultation sessions.
» Written, faxed or e-mail correspondence.

All comments received during the 30-day review period will be included in **Appendix C9** and minutes of all meetings held during the review period will be included in **Appendix C8** within the Final EIA report.

Table 5.4: Public involvement for Dicoma PV

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.	13 October 2021
Placement of site notices.	12 October 2021
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	15 October 2021
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.	15 October 2021
30-day review and comment period of the Scoping Report.	15 October 2021 – 15 November 2021
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions. » Direct in-person consultation will only take place in limited numbers and where sanitary conditions can be maintained at all times.	Meeting with adjacent landowners: 12 October 2021 13 October 2021 26 October 2021 27 October 2021 03 November 2021
Advertising of the availability of the EIA Report for a 30-day review and comment period in Noordwester Newspaper, including details on how to access the EIA Report via Savannah Environmental's website	04 February 2022
Distribution of notification letters announcing the acceptance of scoping and 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) and key stakeholder groups.	03 February 2022
30-day review and comment period of the EIA Report	07 February 2022 – 09 March 2022
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group:	Meeting with adjacent landowners: 12 October 2021

» Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions. Direct in-person consultation will only take place in limited numbers and where sanitary conditions can be maintained at all times.	13 October 2021 26 October 2021 27 October 2021 03 November 2021
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA process

iii. Registered I&APs entitled to Comment on the Scoping/EIA process

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

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

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

(2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to –

(a) A lack of skills to read or write;
(b) Disability; or
(c) Any other disadvantage;

Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database were notified by means of a notification letter of the release of the Scoping Report for a 30-day review and comment period. Similarly, 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 EIA Report has been made available on the Savannah Environmental website (i.e. online stakeholder engagement platform) (https://www.savannahsa.com/public-documents/energy-generation/Dicoma-solar-development/). The report has not been made available in soft copies to I&APs due to restrictions and limitations on public spaces and limitations in ensuring sanitary conditions of hard copy documents during the national state of disaster related to COVID-19. No hard copies of the report have been made available for review and comment in accordance with the approved Public Participation Plan. The notification was distributed prior to commencement of the 30-day review and comment period, on **03 February 2022**. Where I&APs are not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions are used to provide the I&APs with a platform to verbally raise their concerns and comments on the proposed development.

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

iv. Identification and Recording of Comments

Comments raised by I&APs to date have been collated into a Comments and Responses (C&R) Report which is included in **Appendix C9** of the EIA Report. The C&R Report includes detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised. The C&R Report will consist of written comments received.

Meeting notes of all virtual meetings and discussions undertaken during the 30-day review and comment period will be included in **Appendix C8** of the final EIA Report.

The C&R Report will be updated with all comments received during the 30-day review and comment period and will be included as **Appendix C9** in the final EIA Report that will be submitted to the DFFE for decision-making.

5.5 Outcomes of the DEA Web-Based Screening Tool

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

The requirement for the submission of a Screening Report (included as Appendix L of the Scoping/EIA reports Report) for the Dicoma PV facility is applicable as it triggers Regulation 19 of the EIA Regulations, 2014 (as amended). **Table 5.5** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team considering the project site under consideration.

Table 5.5: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of the Dicoma PV facility

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural Impact Assessment	High	The Soils and Agricultural Impact Assessment has been undertaken for the proposed project and is included in this EIA Report as **Appendix F**.
Landscape/Visual Impact Assessment	Very high	A Visual Impact Assessment has been undertaken for the proposed project and is included in this EIA Report as **Appendix H**.
Archaeological and Cultural Heritage Impact Assessment	Low	A Heritage Impact Assessment which covers both archaeological and cultural aspects of the project site has been undertaken for the proposed project and is included in this Report as **Appendix G**.
Palaeontology Impact Assessment	Very High	A Heritage Impact Assessment (which covers palaeontological aspects of the project site) is included in this Scoping Report as **Appendix G.**

Terrestrial Biodiversity Impact Assessment	Very high	An Ecological Impact Assessment has been undertaken for the proposed project and is included in this EIA Report as **Appendix D**.
Aquatic Biodiversity Impact Assessment	Very high	An Ecological scoping study (including freshwater) was undertaken for the project, and it was found that no wetland or watercourse features are located within the project site as well as within the 500m regulated area, and no surface freshwater resource features will be impacted by the proposed development. As such, further assessments relating to freshwater resource features during the EIA phase were not considered to be relevant or required.
Avian Impact Assessment	High	An Avifauna Impact Assessment has been undertaken for the proposed project and is included in this EIA Report as **Appendix E**.
Civil Aviation Assessment	Medium	The Civil Aviation Authority will be consulted during the 30-day review and comment period of the EIA report to provide comments on the proposed development.
Defence Assessment	Low	A defence or military base is not located within close proximity to the PV facility. Further consultation is not required.
RFI Assessment	Medium	The project site under consideration for is located within 1km from a telecommunications tower. The South African Radio Astronomy Observatory (SARAO) will be consulted during the 30-day review and comment period of the EIA report to provide comments on the proposed development.
Plant Species Assessment	Medium	An Ecological Impact Assessment (including flora and fauna) has been undertaken for the proposed project and is included in this EIA Report as **Appendix D**.
Animal Species Assessment	Low	

5.6 Assessment of Issues Identified through the EIA Process

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

Specialist	Area of Expertise	Refer Appendix
Gerhard Botha - Nkurenkuru Ecology & Biodiversity	Ecology (Terrestrial and Freshwater)	Appendix D
Lukas Niemand – Pachnoda Consulting	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
Nondumiso Bulunga – Savannah Environmental And peer reviewed by Tony Barbour	Social	Appendix I
Jacques Nel and Dirk van der Merwe - BVi Consulting Engineers Western Cape (Pty) Ltd	Traffic	Appendix J

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

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high)
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2
  - Medium-term (5–15 years) – assigned a score of 3
  - Long term (> 15 years) - assigned a score of 4
  - Permanent - assigned a score of 5
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes
  - 4 is low and will cause a slight impact on processes
  - 6 is moderate and will result in processes continuing but in a modified way
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen)
  - Assigned a score of 2 is improbable (some possibility, but low likelihood)
  - Assigned a score of 3 is probable (distinct possibility)
  - Assigned a score of 4 is highly probable (most likely)
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures)
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high
- The **status**, which is described as either positive, negative or neutral
- The degree to which the impact can be reversed
- The degree to which the impact may cause irreplaceable loss of resources
- The degree to which the impact can be mitigated

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

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

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

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

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

» **60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area)

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

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

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

As the 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. An Environmental Management Programme (EMPr) that includes all the mitigation measures recommended by the specialists for the management of significant impacts is included as **Appendix K** to this EIA Report.

5.7 Assumptions and Limitations of the EIA Process

The following assumptions and limitations are applicable to the EIA process for Dicoma PV:

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

The specialist studies in **Appendices D-J** include specialist study-specific limitations.

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

The following legislation and guidelines have informed the scope and content of this EIA 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;
- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation; and
- International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

Several other Acts, standards or guidelines have also informed the project process and the scope of issues addressed and assessed in this EIA Report. A review of legislative requirements applicable to the proposed project is provided in **Table 5.6**.

Table 5.6: Relevant legislative permitting requirements applicable to Dicoma PV

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. The EIA process will culminate in the submission of a Final Scoping Report and a Plan of Study for EIA to DFFE for approval. Considering the capacity of the proposed Dicoma PV facility project (contracted capacity of 75MW) 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.

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 scoping study (including freshwater) was undertaken for the project, and it was found that no wetland or watercourse features are located within the project site as well as within the 500m regulated area, and no surface freshwater resource features will be impacted by the

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)).		proposed development. Further assessments relating to freshwater resource features during this EIA phase were not applicable or 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.
	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.	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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.		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. 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.	South African Heritage Resources Agency (SAHRA) North West Provincial Heritage Resource Agency) – provincial heritage authority	A full Heritage Impact Assessment (HIA) (with field work) has been undertaken as part of the EIA process (refer to **Appendix G** of this EIA Report). A number of stone structures that are likely to represent human burial (A stone structure was identified within the development area. It is likely that this is a burial site (LICBUR?1, LICBUR2, LICBUR6, LICBUR10, LI9, LI13 and LI14). were identified within the project site. These sites were graded IIIA (high local significance) and a 10m no-development buffer has been recommended by the specialist. Should a heritage resource of significance be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone (NBKB) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). This will be determined as part of the final walk-through survey once the final location of the development footprint and its

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			associated infrastructure has been determined.
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 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).	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. During the survey no plant SCC was recorded. Four provincially protected plant species were confirmed, namely, (*Hypoxis hemerocallidea, Boophone disticha, Schizocarphus nervosus* and *Delosperma floribundum*). Individual scattered *Vachelia erioloba* (national protected tree) were confirmed on site (refer to the Ecological Impact Assessment Report (**Appendix D**)).
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	DFFE North West DEDECT	An Ecological Impact Assessment has been undertaken for the PV facility and is included as **Appendix D** of the EIA Report

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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).		
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: » 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.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			» A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	DFFE	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals. An Ecological Impact Assessment has been undertaken for the PV facility and is included as **Appendix D** of the EIA Report. Individual scattered *Vachelia erioloba* (national protected tree) were confirmed on site.
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it.	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of Dicoma PV, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.

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

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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.	North West Department of Public Works and Roads (NWDPWR)	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 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.	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 protected plant or animal species found on site. During the survey no plant SCC was recorded. However, four provincially protected plant species were confirmed, namely, (*Hypoxis hemerocallidea, Boophone disticha, Schizocarphus nervosus* and *Delosperma floribundum*), and individual scattered Vachelia erioloba (national protected tree) were also confirmed. (refer to the Ecological Impact Assessment Report. (**Appendix D**)).

5.8.1 Best Practice Guidelines Birds & Solar Energy (2017)

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

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

(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 5.6** 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 5.2: 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, a dry season and wet season bird monitoring survey will be conducted in line with Regime 2 for the Dicoma PV. The dry season survey has already been conducted in August 2021; the findings has been used to inform the avifauna scoping report completed for the Scoping phase. The result from the wet season bird monitoring will be used to inform both the development footprint as well as Avifauna Impact Assessment report, to be completed for the EIA Report.

5.8.2 The IFC Environmental Health and Safety (EHS) Guidelines

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

- IFC EHS General Guidelines
- IFC 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

5.7.3 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

Construction activities lead to temporary air emissions (dust and vehicle emissions), noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites and worker accommodation. In addition, Occupational Health and Safety (OHS) is an issue that needs to be properly managed during construction in order to minimise the risk of preventable accidents leading to injuries and / or fatalities. Proper OHS risk identification and management measures should be incorporated in every project's management plan and standard Engineering, Procurement and Construction (EPC) contractual clauses.

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

Water Usage

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

Further, many projects are likely to be constructed in areas with a scarcity of water and electricity. Therefore, the use of these resources during construction and operation of the plant may have an impact on the local economy. Careful siting and design of the projects should minimise this potential impact.

Response:
Water will be required for the construction and operation phases of the facility. Water will be sourced from the Ditsobotla Local Municipality. A request for confirmation of water availability for the project will be submitted to the Ditsobotla Local Municipality.

Land Matters

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

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

Landscape and Visual Impacts

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

Response:
Potential visual impacts associated with the development of Dicoma PV Facility have been assessed as part of the Visual Impact Assessment specialist study conducted as part of the EIA process. Measures required to avoid, or if avoidance is not possible minimise, and mitigate any negative visual impacts have been identified, and are contained within the EMPr prepared for the project and attached as **Appendix K** to this EIA Report.

Ecology and Natural Resources

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

Response:
Potential ecological impacts associated with the development of Dicoma PV Facility have been assessed as part of the Ecology Impact Assessment (refer to **Appendix D**) and Avifauna Impact Assessment (refer to **Appendix E**) conducted as part of the EIA process. Measures with which to avoid, or if avoidance is not possible minimise, and mitigate any negative ecological impacts have been identified, and are contained within the EMPr prepared for the project and attached as **Appendix K** to this EIA Report. Areas of ecological sensitivity have been utilised to inform the development footprint so that such areas are suitably avoided.

Cultural Heritage

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

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

Transport and Access

The impacts of transportation of materials and personnel should be assessed in order to identify the most appropriate transport route to the site while minimising the impacts on project-affected communities. The requirement for any oversized vehicles / abnormal loads should be considered to ensure access is appropriate. Onsite access tracks should be permeable and developed to minimise disturbance to agricultural land. Where project construction traffic has to traverse local communities, traffic management

plans should be incorporated into the environmental and social management plan and EPC requirements for the project.

Response:
The project site can be readily accessed via existing access roads in the region. Within the facility development footprint, access will be required from new / existing roads for construction purposes (and limited access for maintenance during operation). The facility layout has been determined following the identification of site related sensitivities.

The national, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase of the solar PV facility. Some of the components (i.e. on-site substation transformer) may be defined as abnormal loads in terms of the National Road Traffic Act (No. 93 of 1996) (NRTO) by virtue of the dimensional limitations. A permit will be required in accordance with Section 81 of the National Road Traffic Act (No. 93 of 1996) (NRTA) which pertains to vehicles and loads which may be exempted from provisions of the Act.

Drainage / Flooding

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

Response:
A stormwater management plan has been prepared for the project and is included within the project EMPr attached as **Appendix K** of this EIA Report.

Consultation and Disclosure

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

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

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

Response:
A Public Participation Process as prescribed by Chapter 6 of the 2014 EIA Regulations (GNR 326) is being conducted as part of the EIA process being undertaken for the project. This Public Participation Process includes consultation with key authorities, affected and surrounding landowners, local communities, and other relevant stakeholders.

Environmental and Social Management Plan (ESMP)

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

Response:
Impacts associated with the construction phase of development have been identified and assessed as part of the independent specialist studies undertaken as part of the EIA process. Appropriate mitigation measures with which to minimise the significance of negative impacts have been identified and are included in the EMPr prepared for the project and attached as **Appendix K t**o this EIA Report.

CHAPTER 6: DESCRIPTION OF THE RECEIVING ENVIRONMENT

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

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

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

Requirement	Relevant Section
(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	The environmental attributes associated with the development of Dicoma PV is included within this chapter. The environmental attributes that are assessed within this chapter includes the following: » The regional setting of the broader study area and the project site indicates the geographical aspects associated with Dicoma PV. This is included in **Section 6.2**. » The climatic conditions for the greater Lichtenburg area have been included in **Section 6.3**. » The biophysical characteristics of the project site and the surrounding areas are included in **Section 6.4**. The characteristics considered are topography and terrain, geology, soils and agricultural potential and the ecological profile which includes the vegetation patterns, listed plant species, critical biodiversity areas and broad-scale processes, freshwater resources, terrestrial fauna and avifauna. » The heritage and cultural aspects (including archaeology and palaeontology) have been included in **Section 6.5**. » The social and socio-economic characteristics associated with the broader study area and the project site have been included in **Section 6.6.**

A more detailed description of each aspect of the affected environment is included in the specialist reports included in Appendices D to J of this EIA report.

6.2. Regional Setting

The Dicoma PV facility development area is located near Lichtenburg in the North West Province. 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 7th most densely populated Province.

The North West Province is characterised by altitudes ranging from 920 - 1782m amsl, with the central and western extents of the province 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 four Districts, namely Bojanala Platinum, Ngaka Modiri Molema, Dr Ruth Segomotsi Mompati, and Dr Kenneth Kaunda.

The town of Lichtenburg is located in the Ngaka Modiri Molema District Municipality at the centre of the maize triangle, which is considered to be the primary maize growing area within South Africa. As a result, the area'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 in the area. 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 proposed project area is characterised by a relative flat to gradual sloping plains-dominated landscape with a low dolerite outcrop to the south of the development footprint. The properties to the north, south and east are mainly small holdings with residential areas and patches of land utilised for small scale subsistence farming. The properties to the west, on the other hand, are larger and utilised mostly for commercial farming practises.

The project site is located approximately 4km north of Eskom's Watershed MTS Substation. The power lines which traverse the site to the south include:

- Watershed-Klerksdorp 132kV power line
- Dudfield - Watershed 1 and Dudfield - Watershed 2 88kV power line
- Delareyville Municipal - Watershed 1 88kV power line
- Watershed-Sephaku 88kV line.

Additional power lines within the project site include:

- Watershed-Zeerust 1 132kV power line
- Slurry PPC-Watershed 1 88kV power line
- Watershed-Mmabatho 1 and 2 88kV power line
- Pluto-Watershed 1 275kV power line

» Hera-Watershed 1 275kV power line
» Halfpad Traction-Watershed 1 132kV power line
» Whites North-Watershed 1 and 2 88kV power line
» Lichtenburg Munic-Watershed 1 88kV power line

Access to the project site is via a secondary (gravel) District Road (D2435) that joins the regional road R505 located to the east of the project site. The condition of the general environment as well as the gravel access road are illustrated in Figure 6.1 and Figure 6.2.

Figure 6.1: General environment within the study area

Figure 6.2: Gravel access road from the R505 arterial road

6.3. Climatic Conditions

The suitability of the site for the development of a solar facility is dependent on the prevailing climatic condition of the area. The viability of the solar farm is directly affected by the amount of solar irradiation received in the area. The GHI for the North West Province varies between 2 060 and 2 240kWh/m^2/annum, which relates to the higher end of the spectrum. The irradiation received in the location of the proposed site is approximately 2 143kWh/m^2/annum (refer to **Figure 6.**).

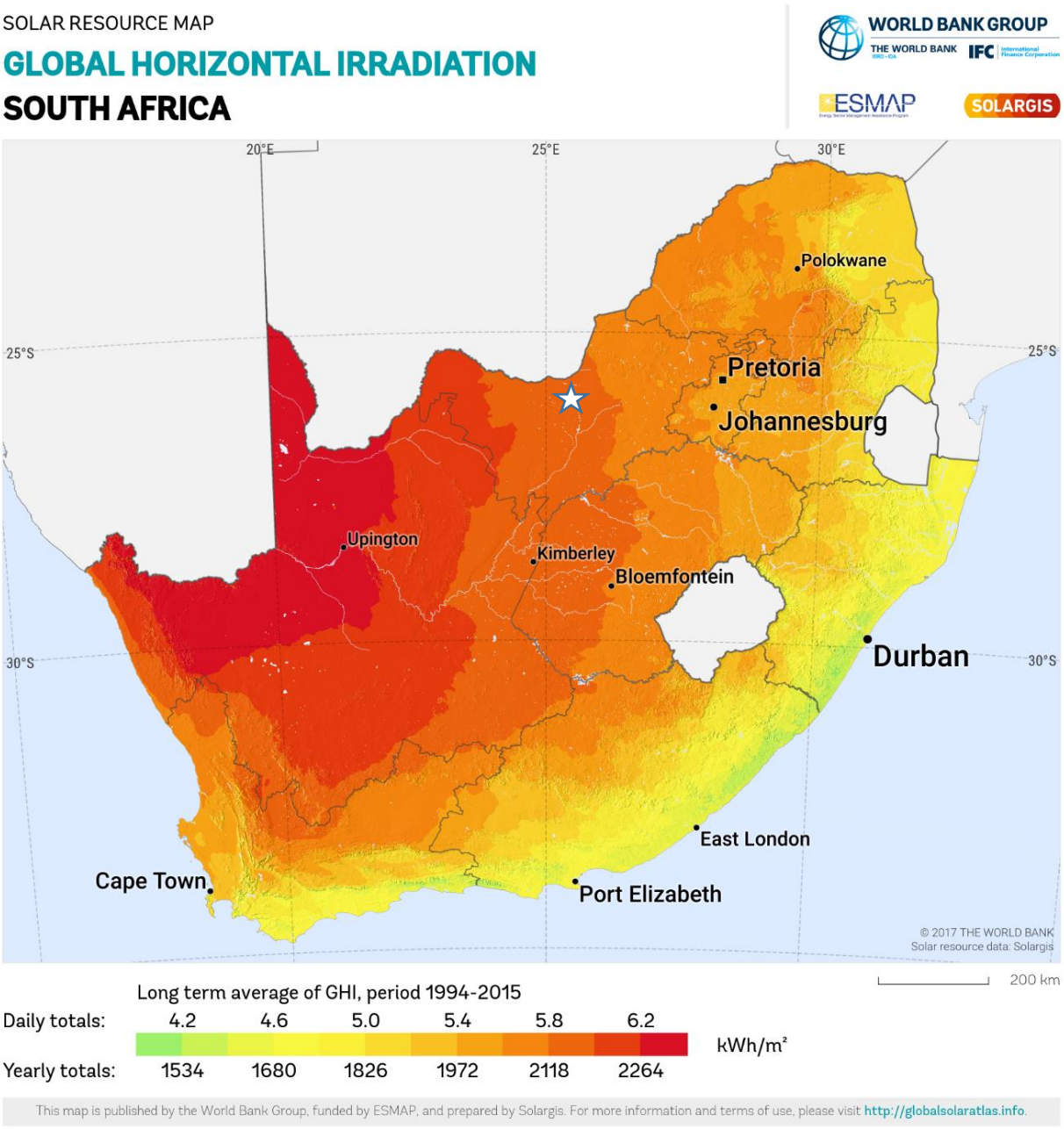


Figure 6.3: GHI map for South Africa (Source: World Bank Group Solar Map). The location of Dicoma PV is shown by the white star on the map

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 6.4** and **Table 6.1**). Frost 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.

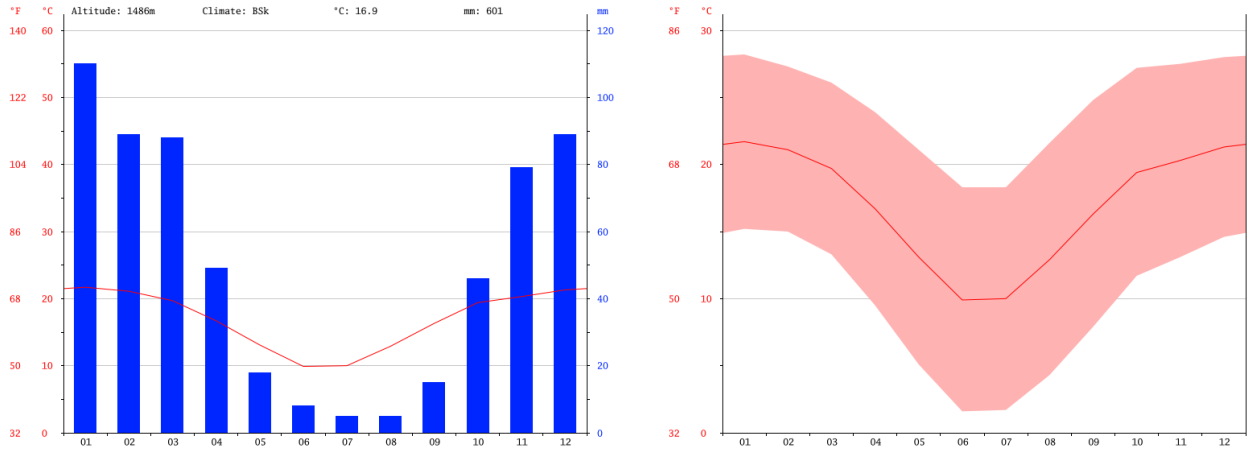


Figure 6.4: Climate and temperature graphs for Lichtenburg, North West Province (Source: en.climate-data.org).

Table 6.1: 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

6.4. Biophysical Characteristics of the Development Area

The following section provides an overview of the biophysical characteristics of the development area.

6.4.1. 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 a very gradual drop (approximately 70m) from the northern section of the study area (1520m amsl) to the Die Vlei River (1450m) which flows through Lichtenburg. This perennial river, wetlands and farm dams near this town, account for the dominant hydrological features within this region that receives between 500mm to 650mm rainfall per annum.

6.4.2. Geology, Soils and Agricultural Potential

i. Geological profile

The geology of the development area comprises dolomite and chert belonging to the Chuniespoort Group (AGIS), supporting mostly shallow Mispah and Glenrosa soil forms typical of the Fa land type (Mucina & Rutherford, 2006). Chert gravels are abundant on midslopes and footslopes including valley bottoms (AGIS, 2014). The project site overlies Precambrian (Proterozoic) dolomites and associated marine sedimentary rocks that are assigned to the Malmani Subgroup (Chuniespoort Group) within the Transvaal Supergroup. The 2km-thick Malmani Subgroup succession consists of a series of formations of stromatolitic and oolitic carbonates (limestones and dolomites), cherts, and black carbonaceous shales. The bedrock unit represented at the project site is the Monte Christo Formation that comprises some 300m to 500m of breccias as well as stromatolitic and oolitic platform carbonates, including cherty dolomites. The Malmani carbonates in the project site have been subject to karstic (solution) weathering processes with near-surface concentration of insoluble materials (chert, ferromanganese minerals, etc.) through secondary precipitation and downwasting. The diamond deposits in the Lichtenburg area are associated with weathered, kaolinitised alluvial or eluvial (residual) gravels of Late Cretaceous or younger Tertiary age that may have been associated with south-flowing tributaries of the palaeo-Harts drainage system across the Cargonian palaeo-highlands (De Wit 1981, De Wit et al. 2000, Partridge et al. 2006, cf Dollar 1998). Surface gravels in the project site are dominated by cherty, and dolomitic clasts, downwasted from the Malmani dolomites. Surface exposures of pedogenic calcrete overlying the dolomitic bedrocks may also be present in some localities.

ii. Soils and agricultural capability

Existing soil information was obtained from the Land Type database (Land Type Survey Staff, 1972 – 2002). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units.

The Dicoma PV development area comprises of Land Type Bc11 on its south western boundary and the remaining area consists of Land Type Fa11 (refer to **Figure 6.5**).

The soil profiles classified within the Dicoma PV development area consist of the Glenrosa, Mispah and Nkonkoni forms. The Glenrosa soils are present at around 80% of the area, while the Mispah forms are found at 15%, and the remaining 5% is Nkonkoni soils. The Glenrosa soils range in depth between 0.25m and 0.40m, while the Mispah soils are between 0.05m and 0.20m deep. The Nkonkoni soils are between 0.40m and 0.90m deep. There are no crop field boundaries within the Dicoma PV development area. Crop fields with rainfed annual crops and planted pastures as well as centre pivot irrigation are present directly west of the Dicoma site. More pivot irrigation is present about 8km north and 4km north-east of the site.

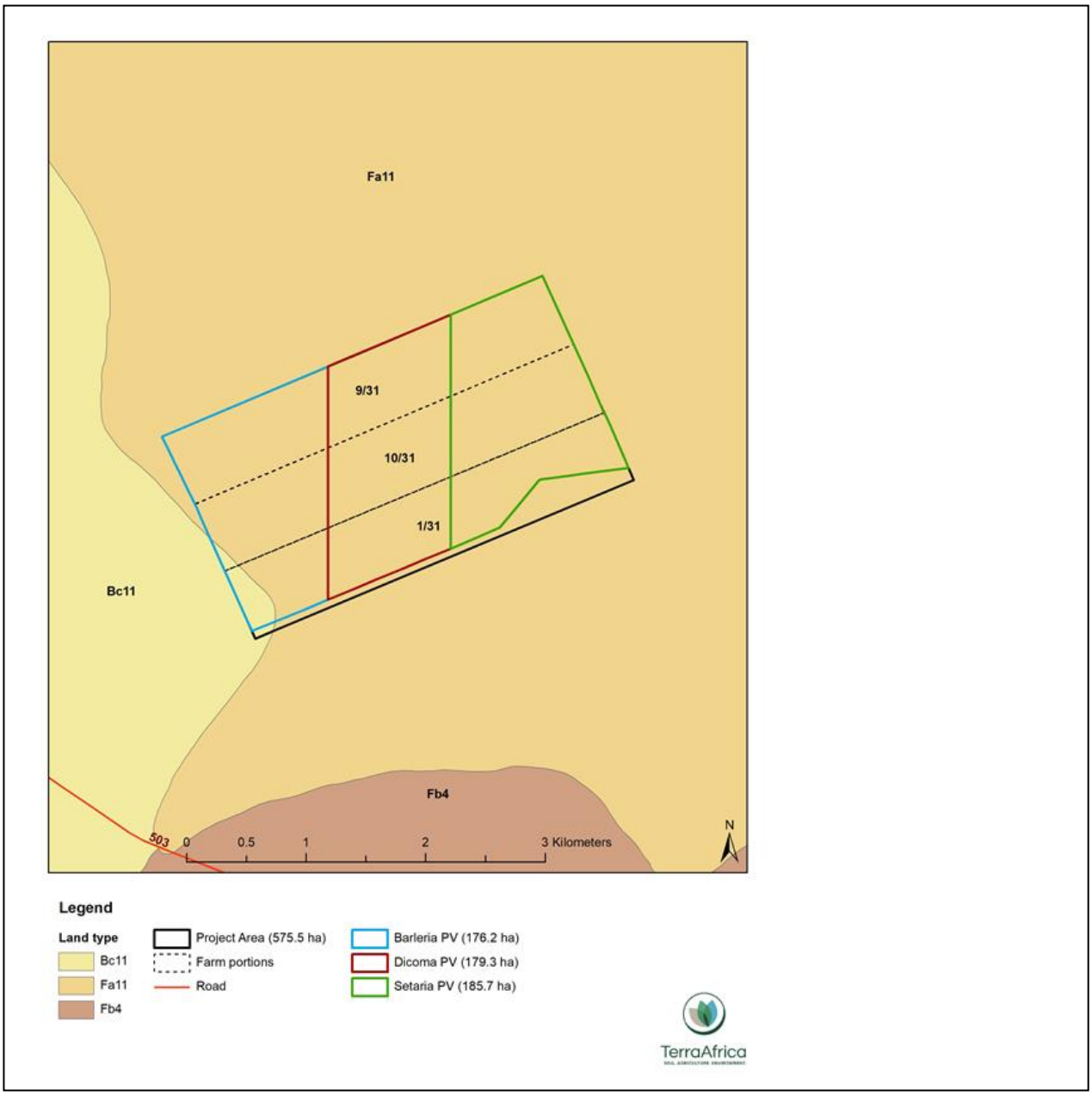
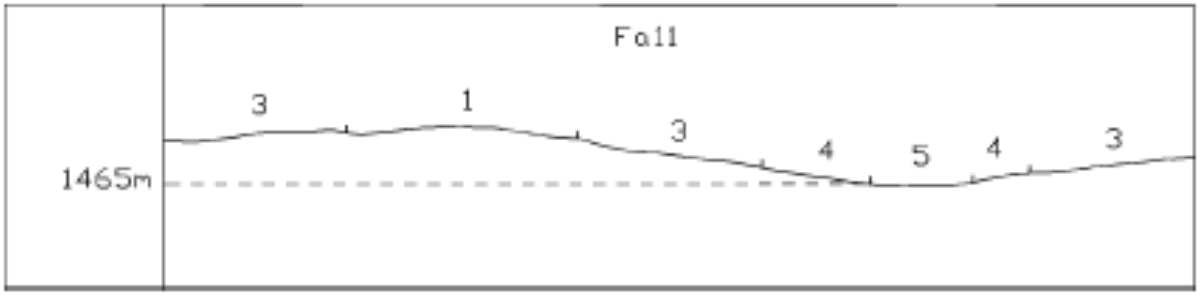


Figure 6.5: Land type map of the Dicoma PV facility (shown in Red) Including Dicoma and Setaria PV facilities

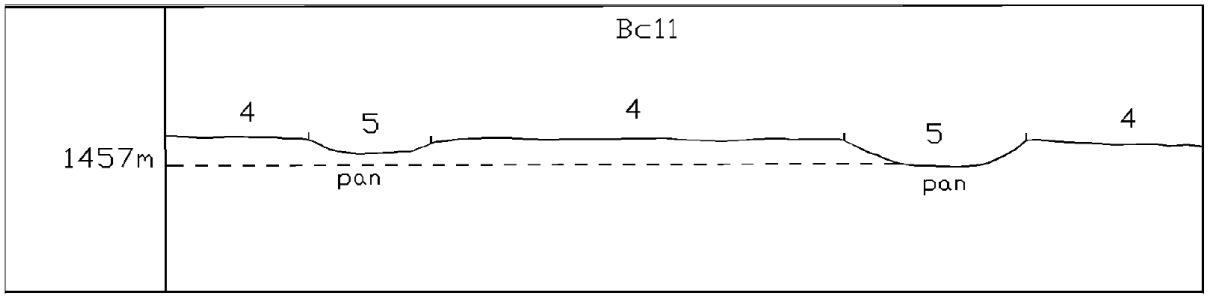
» Land Type Fa11

The terrain forms of Land Type Fa11 are depicted below. The crests and mid-slopes (Terrain units 1 and 3) are dominated by soil of the Glenrosa and Mispah forms. The rest of this land type consists of yellow-brown and red apedal (structureless) soil either underlain by unspecified material or by plinthic material (either soft or hard plinthite) along the toe-slopes and valley bottoms (Terrain units 4 and 5, respectively). According to the land type charts, 40 to 50% of foot slope and valley bottom positions consist of these deeper soil forms. The valley bottoms might potentially consist of a hydromorphic soil form that may have wetland potential. The slope of the terrain is very flat with Terrain unit 3 having the steepest slope (between 2% and 5%). The clay content of the topsoil horizons is estimated to range between 10% and 25% while subsoil clay content is estimated to range between 13% and 40%.



» Land Type Bc11

In comparison to Land Type Fa11, Land Type Bc11 consists only of two different terrain units that are illustrated below. Of the entire land type area, 95% consists of flat toe-slopes (with slope between 0 and 2%) with slope length between 1300 and 1700m. These areas consist predominantly of Westleigh, Hutton, Avalon, Glencoe and Bainsvlei soil forms. The remaining 5% of the land type area consists of valley bottoms (Terrain unit 5). The valley bottoms have about 60% soils of the Sterkspruit form and 40% soils of the Rensburg form. The slope length of the valley bottoms is short (between 50 and 100m) and slope ranges between 0 and 1%.



iii. Land use and carrying capacity

The current land use of the site is extensive livestock farming with cattle. The available grazing consists of natural veld and there are no planted pastures and no grass harvesting and baling. The grazing capacity of the development area is 8ha/LSU. The development area, therefore, has the capacity to feed 22 head of cattle. The surrounding land uses include irrigated and rainfed production of grain crops to the west of the site while the areas located north, east and south of the site are used for livestock farming.

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

i. Vegetation description and associated habitats

The overall project area is situated within the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

» Seasonal precipitation; and
» The minimum temperatures in winter (Mucina & Rutherford, 2006).

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Therefore, trees are typically absent, except in a few localised habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The grassland biome comprises many different vegetation types. The full extent of the PV facility footprint is located within the Carletonville Dolomite Grassland vegetation type (Gh15) according to Mucina and Rutherford (2006) (refer to **Figure 6.6**).

» **Carletonville Dolomite Grassland**

The distribution of the vegetation type is mostly found within the North West Province extending into Gauteng and a small portion of the Free State Province. This vegetation type is mostly associated with the Potchefstroom, Ventersdorp and Carletonville regions, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng. This vegetation type is mainly found between elevations of 1 360m and 1 620m, but mostly between 1 500m and 1 560m. This vegetation type has been described by Mucina and Rutherford (2006) as species-rich grasslands forming a complex mosaic pattern across slightly undulating plains dissected by prominent rocky chert ridges. Depending on specific underlying geology and soils, the species composition of plant communities varies in a complex mosaic pattern, and several species may be co-dominant.

Typical plant communities are dominated by the grasses *Brachiaria serrata*, *Cynodon dactylon, Digitaria tricholaenoides, Diheteropogon amplectans, Themeda triandra, Eragrostis chloromelas, Setaria sphacelata*, and *Heteropogon contortus*. Prominent forbs and low shrubs include *Acalypha angustata, Dicoma macrostegia, Crabbea angustifolia, Dicoma anomala*, and several *Helichrysum* species. The diversity of perennial grasses and forbs is typically high for these grasslands.

The typical low grasslands are interspersed with a low density of high shrubs and low trees. Most of these are *Acacia, Ziziphus* and *Searsia* species.

» **Important Plant Taxa**

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006). The following species are important in the Carletonville Dolomite Grassland.

Graminoids: *Aristida congesta, Brachiaria serrata, Cynodon dactylon, Digitaria tricholaenoides, Hiheteropogon ampletens, Eragrostis chloromelas, E. racemosa, Heteropogon contortus, Loudetia simplex, Schizachyrium sanguineum, Setaria sphacelata, Themeda triandra, Alloteropsis semilata subsp. eckloniana, Andropogon schirensis, Aristida canescens, A. diffusa, Bewsia bifola, Bulbostylis burchellii, Cymbopogon*

caesius, Elinonurus muticus, Eragrostis curvula, E. gummiflua, E. plantana, Eustachys paspaloides, Hyparrhenia hirta, Melinis nerviglumis, M. repens subsp. repens, Monocymbium ceresiiforme, Panicum coloratum, Pogonarthria squarrosa, Trichoneura grandiglumis, Triraphis andropogonoides, Tristachya leucothrix, T. rehmannii.

Herbs: *Acalypha angustata, Chamaecrista mimosoides, Euphorbia inaequilatera, Crabbea angustifolia, Dianthus mooiensis, Dicoma anomala, Helichrysum caespititium, H. miconiifolium, H. nudifolium var. nudifolium, Ipomoea ommaneyi, Justicia anagalloides, Kohautia amatymbica, Kyphocarpa angustifolia, Ophrestia oblongifolia, Pollichia campestris, Senecio coronatus, Hillardia oligocephala.*

Geophytic Herbs: *Boophane disticha (Declining – Red List), Habenaria mossii*

Succulent Herb: *Tripteris aghillana var. integrifolia*

Low Shrubs: *Anthospermum rigidum subsp. pumilum, Indigofera comosa, Pygmaethamnus zeyheri var. rogersii, Searsia magaliesmontana, Tylosema esculentum, Ziziphus zeyheriana* (Mucina & Rutherford, 2006). Geoxylic Suffrutex: *Elephantorrhiza elephantina, Parinari capensis subsp. capensis*

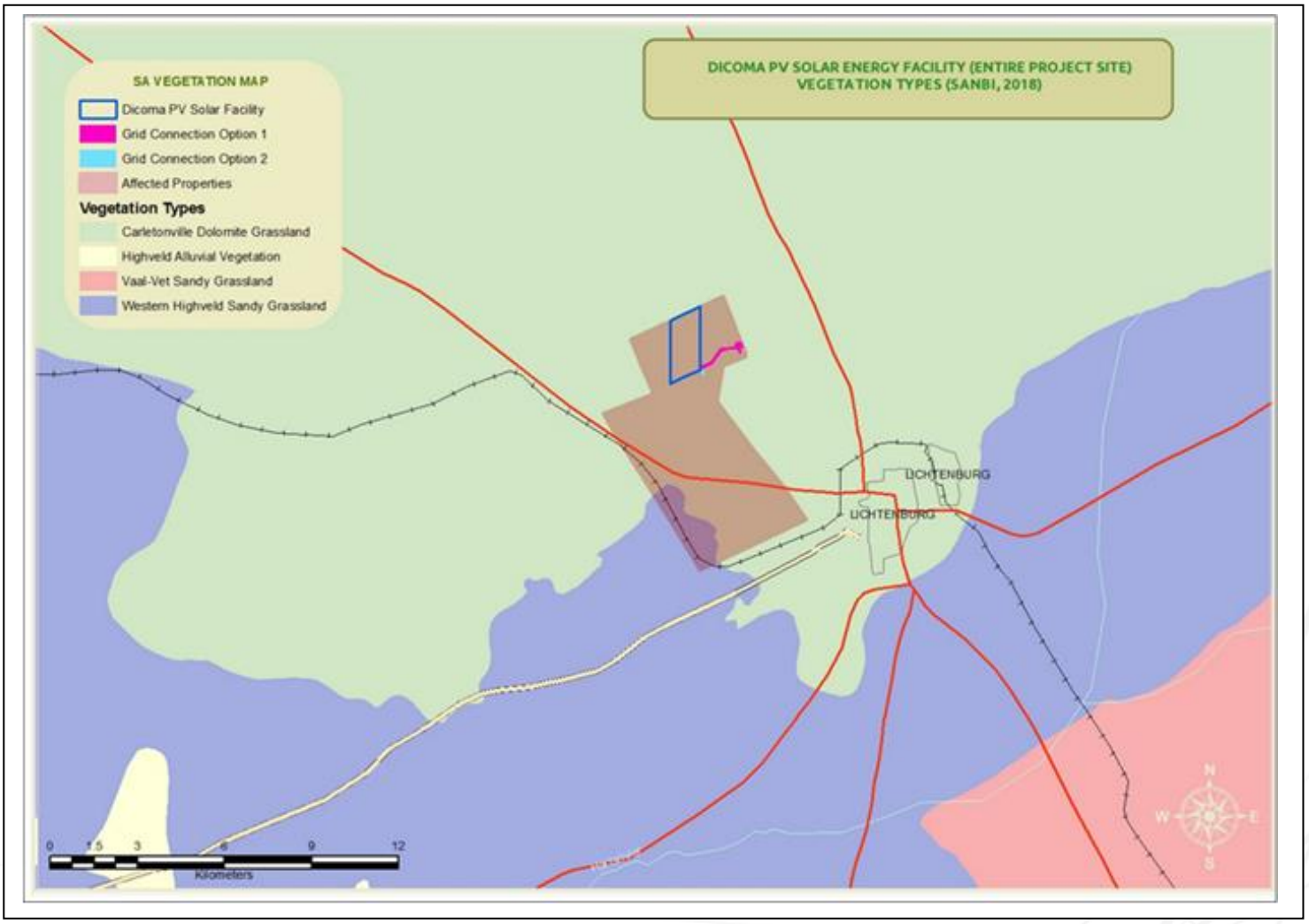


Figure 6.6: Vegetation types mapped across the Dicoma PV development area (indicated in Blue) (SANBI, 2018)

ii. Fauna

a) Amphibians

Based on the IUCN Red List Spatial Data (IUCN, 2017), 19 amphibian species can be expected to occur within the vicinity of the project site, and according to the distribution maps of Du Preez & Carruthers (2009) and Minter *et al*. (2004) a total of 21 amphibian species may be found within the region. According to both resources, one amphibian species of conservation concern could be present within the region where suitable habitat is present namely *Pyxicephalus adspersus* (Giant Bullfrog).

Of the 21 amphibian species that have a distribution that includes the study area, only 12 are known to occur in QDSs 2625BB, 2626AA, 2525DD and 2526CC (FrogMap, 2018). No amphibian Species of Conservation Concern (SCC) were recorded within the relevant QDSs.

Due to the relatively homogenous nature of the project site, the absence of freshwater resource features, it is expected that the diversity within the study area itself will be very low. No amphibian species were recorded during the specialist site survey.

b) Reptiles

Based on the IUCN Red List Spatial Data (IUCN, 2017), 55 reptilian species can be expected to occur within the vicinity of the project site, and according to the distribution maps of Bates *et al*. (2014) a total of 71 terrestrial reptilian species may be found within the region. According to both resources, none of these species are listed red data species or significantly range restricted (reptile SCC). However, one species is nationally protected (TOPS) namely, the Southern African Python (*Python natalensis)*.

Of the 71 reptilian species that have a distribution that includes the study area, 28 are known to occur in QDSs 2625BB, 2626AA, 2525DD and 2526CC (ReptileMap, 2021), and includes the Southern African Python (TOPS). Furthermore, of these species recorded within the relevant QDSs, 13 species are endemic/near endemic to South Africa.

Due to the relatively homogenous nature of the study area, it is expected that the diversity within the study area itself will be relatively low.

During the specialist site survey only three reptile species were recorded, with none of these species regarded as SCC. It is anticipated that some additional reptilian species could be recorded during the warmer, wetter months (summer to early autumn), however, it is still expected that diversity will be low.

c) Mammals

Based on the IUCN Red List Spatial Data (IUCN, 2017), 84 mammal species can be expected to occur within the vicinity of the project site. Of these species, 12 are medium to large conservation dependant species, such as *Diceros bicornis* (Hook-lipped Rhinoceros) and *Equus quagga* (Plains Zebra) that, in South Africa, are generally restricted to protected areas such as game reserves. These species are not expected to occur in the project site and are removed from the expected SCC list. Of the remaining 72 small- to medium sized mammal species, ten (10) are listed as being of conservation concern on a regional or global basis. According to Skinner & Chimimba (2005) and Apps (2012), the potential diversity of mammals within the region is slightly higher high with as many as 98 terrestrial mammals potentially occurring within the area. Of

the 98 mammals that have a distribution that includes the study area, 77 are known to occur in QDSs 2625BB, 2626AA, 2525DD and 2526CC (MammalMap, 2021). Of the species that have a distribution that includes the study area, 11 species are regarded as mammal SCC (refer to **Table 6.3**).

The list of potential species includes:

- Five (5) that are listed as Vulnerable (VU) on a regional basis; and
- Nine (6) that are listed as Near Threatened (NT) on a regional scale.

There are several factors which will reduce the actual number of species present with the study area. This includes the largely homogenous nature of the project site, the fractured landscape, surrounding agricultural practices (especially cultivation), the presence of large roads and other anthropogenic activities. Due to these factors, it is expected that the diversity within the study area itself will be moderate to low.

A number of antelope species have been recorded by the ADU (Animal Demographic Unit) within the QDSs. Most of these antelope species are confined by fences and occur only where farmers have introduced them or allow them to persist and should be considered as part of the farming system rather than as wildlife. Some of these South African indigenous antelope species do not have a natural distribution within the specific region but as mentioned have been introduced by farmers. Such antelope species include; Blue Wildebeest (*Connochaetes taurinus*), Grey Rhebok (*Pelea capreolus*), Mountain Reedbuck (*Redunca fulvorufula*) Red Hartebeest (*Alcelaphus buselaphus*), Impala (*Aepyceros melampus* subsp. *melampus*) and African Savanna Buffalo (*Syncerus caffer*). As in the case of the IUCN generated species list, these medium to large conservation dependant species have been omitted. Both Duiker (*Sylvicapra grimm*ia) and Steenbok (*Raphicerus campestris)* are adaptable species that are able to tolerate high levels of human activity and are not likely to be highly sensitive to the disturbance associated with the development.

During the site visit three protected mammal species (within TOPS as well as Provincial Act) were recorded namely:

- Steenbok (*Raphicerus campestris*): 2 recordings within wooded grassland.
- Aardwolf (*Proteles cristata*): 1 physical recording, 1 active borrow and 1 latrine. The species as well as the active burrow was observed within the wooded grassland. Take note that there were numerous other burrows present within the project site which may be utilised by this species.
- Aardvark (*Orycteropus afer*): 1 physical recording, 2 active borrows of an active burrow within the alluvial wash habitat. The species as well as the active burrows was observed within the wooded grassland. Take note that there were numerous other burrows present within the project site which may be utilised by this species.

The most significant habitat for these protected species, are the wooded grassland (both variations), especially were the soils are suitable for burrowing. Numerous termite mounds were present, especially within the secondary grassland, and these termites for the foundation of the Aardwolf and Aardvark's diet.

iii. Alien invasive species

A total of 16 alien plant species were found within the development footprint (**Figure 6.7**). Of these 16 alien plants, four have been listed as Invasive Alien Plants and include: *Eucalyptus camaldulensis* (Category 2), *E. sideroxylon* (Category 2), *Datura stramonium* (Category 1b), *Verbena stramonium* (Category 1b) and *V. aristigera* (Category 1b). Furthermore, a total of 35 weeds were recorded, of which most were associated with the secondary grassland.

For the primary grassland communities (VegComm SE and AT) weeds (W) and alien plants (AP) where largely absent from the more natural areas. However trampled and overgrazed area as well as the margins of access routes and firebreaks contained varying levels of weeds and alien plants. The most common weeds and alien plants are recorded within these areas includes *Alternanthera pungens* (AP), *Conyza bonariensis* (AP), *Schkuhria pinnata* (AP), *Zinnia peruviana* (AP), *Nidorela resedifolia* (W), *Aristida congesta* (W), *Aristida adscensionis* (W), *Berkheya onopordifolia* (W), *Cynodon dactylon* (W), *Chloris virgata* (W), *Heteropogon contortus* (W) *and Urochloa panicoides* (W). Severely degraded and trampled areas are prone to the invasion of Invasive Alien Plants (IAPs), especially *Datura stramonium* and *Xanthium spinosum* (e.g. trampled areas around kraal and artificial water points).

The secondary grassland (VegComm HE) comprises numerous weeds as well as a few alien plants and include *Conyza podocephala* (AP), *C. bonariensis* (AP), *Schkuhria pinnata* (AP), *Tagetes minuta* (AP), *Chrysocoma ciliata* (W), *Nidorella resedifolia* (W), *Aristida congesta* (W), *Asparagus laricinus* (W), *Solanum lichtensteinii* (W), *Aristida adscensionis* (W), *Hyparrhenia hirta* (W), *Berkheya onopordifolia* (W), *Geigeria burkei* (W) *and Cynodon dactylon* (W).

Invasive alien plants that were not recorded within the development footprint but was observed within the affected properties or in close proximity to the development footprint include: *Melia azedarach* (Category 1b), *Pyracantha angustifolia* (Category 1b), *Solanum sisymbriifolium* (Category 1b), *S. elaeagnifolium* (Category 1b), *Flaveria bidentis* (Category 1b), *Argemone ochroleuca* (Category 1b), *Opuntia ficus-indica* (Category 1b) and *O. humifusa* (Category 1b). The potential for some of these species to encroach and establish in the disturbed development footprint, during the construction phase an operational phase, are relatively high and as such these species should also be taken into account when drafting the Invasive Alien Plant Management Plan.

Table 6.2: Alien plant species recorded within the project site; W = Weed; AP = Alien Plant; IAP = Invasive Alien Plant.

Family	Species	Status
Acanthaceae	*Chamaesyce inaequilatera*	W
Amaranthaceae	*Achyranthes aspera*	W
Amaranthaceae	*Alternanthera pungens*	AP
Amaranthaceae	*Gomphrena celosioides*	AP
Apocynaceae	*Gomphocarpus physocarpus*	W
Asparagaceae	*Asparagus laricinus*	W
Asteraceae	*Berkheya onopordifolia*	W
Asteraceae	*Bidens biternata*	AP
Asteraceae	*Chrysocoma ciliata*	W
Asteraceae	*Conyza bonariensis*	AP
Asteraceae	*Conyza podocephala*	AP
Asteraceae	*Geigeria burkei*	W
Asteraceae	*Lactuca inermis*	W
Asteraceae	*Nidorella resedifolia*	W
Asteraceae	*Pseudognaphalium lutea-album*	AP
Asteraceae	*Schkuhria pinnata*	AP
Asteraceae	*Tragopogon dubius*	AP
Asteraceae	*Zinnia peruviana*	AP
Convolvulaceae	*Convolvulus sagittatus*	W
Cucurbitaceae	*Cucumis zeyheri*	W
Fabaceae	*Tagetes minuta*	AP

Family	Species	Status
Fabaceae	*Tripteris aghillana*	W
Gnidiaceum	*Gnidia polycephala*	W
Myrtaceae	*Eucalyptus camaldulensis*	IAP: Category 2
Myrtaceae	*Eucalyptus sideroxylon*	IAP: Category 2
Plantaginaceae	*Plantago lanceolata*	AP
Poaceae	*Aristida adscensionis*	W
Poaceae	*Aristida adscensionis*	W
Poaceae	*Aristida congesta subsp. Barbicollis*	W
Poaceae	*Aristida congesta subsp. Congesta*	W
Poaceae	*Aristida stipitata*	W
Poaceae	*Chloris virgata*	W
Poaceae	*Cynodon dactylon*	W
Poaceae	*Eragrostis biflora*	W
Poaceae	*Heteropogon contortus*	W
Poaceae	*Hyparrhenia hirta*	W
Poaceae	*Melinis repens*	W
Poaceae	*Schmidtia kalahariensis*	W
Poaceae	*Setaria sphacelata var. torta*	W
Poaceae	*Setaria verticillata*	W
Poaceae	*Sporobolus pyramidalis*	W
Poaceae	*Tragus berteronianus*	W
Poaceae	*Trichoneura grandiglumis*	W
Poaceae	*Urochloa panicoides*	W
Rubiaceae	*Kohautia caespitosa*	W
Asteraceae	*Seriphium plumosum*	W
Solanaceae	*Datura stramonium*	IAP: Category 1b
Solanaceae	*Solanum lichtensteinii*	W
Solanaceae	*Solanum panduriforme*	W
Verbenaceae	*Verbena aristigera*	IAP: Category 1b
Verbenaceae	*Verbena bonariensis*	IAP: Category 1b
Verbenaceae	*Verbena bonariensis*	IAP: Category 1b

iv. Species of Conservation Concern (SCC)

Based on the Plants of Southern Africa (BODATSA-POSA, 2021) database, 453 plant species are expected to occur in the area. Of the 453 -plant species, three are listed Red Data species whilst 16 South African Endemic species have been recorded within the region. Furthermore, according to the generated species list, 12 species have been recorded within the area which is protected under the Transvaal Nature Conservation Ordinance, and one tree species has been recorded which is protected under the National Forest Act namely *Vachellia (Acacia) erioloba* (common name Camel Thorn tree).

A previous study conducted by Strohbach (2013) within the affected properties identified 187 species. Furthermore, this study did not confirm any plant SCC (Red data and range restricted species), however 10 South African Endemic species, five provincially protected and one national protected tree species (*V. erioloba*) were confirmed within the properties comprising the project site.

Also, worth mentioning are species that are not protected or listed as Red Data species but are declining (population decline within South Africa). Such species recorded within the project site include *Boophone disticha, Hypoxis hemerocallidea* and *Pelargonium dolomiticum*. Due to their medicinal value, these species are often exposed to illegal collection and trade within the muti-industry.

During the specialist site survey four provincially protected plant species were confirmed (*Hypoxis hemerocallidea, Boophone disticha, Schizocarphus nervosus* and *Delosperma floribundum*), and scattered individual *Vachelia erioloba* (nationally protected tree) were also confirmed. No plant SCC were confirmed during the site visit (refer to **Table 6.3**).

Table 6.3: List of floral species that are of conservation concern, which may potentially be found in project area

Species	Status	BODATSA-POSA (2021)	Strohbach, (2013)	Specialist Site Visit (2022)	Likelihood of Occurrence
Nananthus vittatus	DD	X			Low
Cleome conrathii	NT & Endemic	X			Moderate
Brachystelma incanum	VU & Endemic	X			Moderate
Gladiolus elliotii	Protected	X			Low
Gladiolus permeabilis	Protected	X			Moderate
Gladiolus sp.	Protected	X			
Crinum graminicola	Protected	X			Moderate
Crinum macowanii	Protected	X	X		High
Brachystelma foetidum	Protected	X			High
Pelargonium dolomiticum	Protected	X			Moderate
Pelargonium sidoides	Protected	X			High
Habenaria epipactidea	Protected	X			Low
Acacia erioloba	Protected	X	X	X	Confirmed
Boophone disticha	Protected	X	X	X	Confirmed
Schizocarphus nervosus	Protected	X		X	Confirmed
Hypoxis hemerocallidea	Protected	X	X	X	Confirmed
Delosperma floribundum	Protected	X	X	X	Confirmed

Table 6.4: List of mammal species of conservation concern that may occur in the project area (IUCN, 2017; SANBI, 2016)

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Red Data	IUCN	
Anonyx capensis	Cape Clawless Otter	NT	NT	Low
Atelerix frontalis	South African Hedgehog	NT	LC	High
Felis nigripes	Black-footed Cat	VU	VU	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	Moderate
Mystromys albicaudatus	White-tailed Rat	VU	EN	Moderate
Crocidura mariquensis	Swamp Musk Shrew	NT	DD	Low
Smutsia temminckii	Ground Pangolin	VU	VU	Low
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyena	NT	NT	Moderate

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Red Data	IUCN	
Poecilogale albinucha	African Striped Weasel	NT	LC	Moderate

v. Critical Biodiversity Areas and Conservation Targets

The Dicoma PV facility falls within the planning domain of the North West Province Biodiversity Conservation Assessment which maps Terrestrial and Aquatic Critical Biodiversity Areas and Ecological Support Areas within the North West Province. In terms of the North West Biodiversity Sector Plan (NWBSP, 2015) Terrestrial and Aquatic Critical Biodiversity Areas, the site is located within the Ecological Support Areas (ESA1)(refer to **Figure 6.7**). The ESA1 ecosystem is defined as moderately to significantly disturbed, but still able to maintain basic functionality. Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. These form the key output of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision-making tools. The use of CBAs within the North West Province follows the definition laid out in the guideline for publishing bioregional plans (Anon, 2008).

According to the guidelines for bioregional plans, three basic CBA categories can be identified based on three high-level management objectives

CBA Category	Land Management Objective
Critical Biodiversity Areas (CBAs) Definition: CBAs are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.	
CBA 1 and Protected Areas	Natural landscapes: » Ecosystems and species fully intact and undisturbed » These are areas with high irreplaceability or low flexibility in terms of meeting biodiversity pattern targets. If the biodiversity features targeted in these areas are lost then targets will not be met. » These are landscapes that are at or past their limits of acceptable change.
CBA 2	Near-natural landscapes: » Ecosystems and species largely intact and undisturbed. » Areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets. » These are landscapes that are approaching but have not passed their limits of acceptable change.
Ecological Support Areas (ESAs) Definition: ESAs are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water and food provision, or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.	
ESA	Functional landscapes: » Ecosystems moderately to significantly disturbed but still able to maintain basic functionality. » Individual species or other biodiversity indicators may be severely disturbed or reduced.

CBA Category	Land Management Objective
Critical Biodiversity Areas (CBAs) Definition: CBAs are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.	
	» These are areas with low irreplaceability with respect to biodiversity pattern targets only.
ONA	Production landscapes: » Manage land to optimise sustainable utilization of natural land.

The following observations regarding the ESA1 within the study area were made following the specialist site surveys:

Terrestrial ESA1: Vegetation of the study area was confirmed to consist of Carletonville Dolomite Grasslands with a relative small-scale plant diversity. Three major vegetation patterns were identified, namely a plagioclimax grassland found on old, historical cultivated areas, a thorny- open savanna grassland to the north and an open parkland type of savanna to the south. Small variations within these major vegetation units manly due to variations in surface rockiness/soil depth as well as past and current disturbances (e.g. trampled areas). Around man-made watering points, homesteads and closer to the entrance and existing power line, weeds and alien invasives become more prominent.

Both types of open savanna grassland were found to be largely natural and is capable of fulfilling the functions and services that is typical of an ESA1, however the extent of the ESA within the project area is somewhat over calculated as a portion of this ESA1 has been historically cultivated and is now covered by a plagioclimax grassland, which should, according to the definitions of the various ESAs, rather be classified as an ESA2. Furthermore, the affected properties as well as the neighbouring properties comprise of numerous small, fenced grazing camps which most likely have had an impact on the connectivity of the landscape thus slightly impacting the integrity of the ESA1.

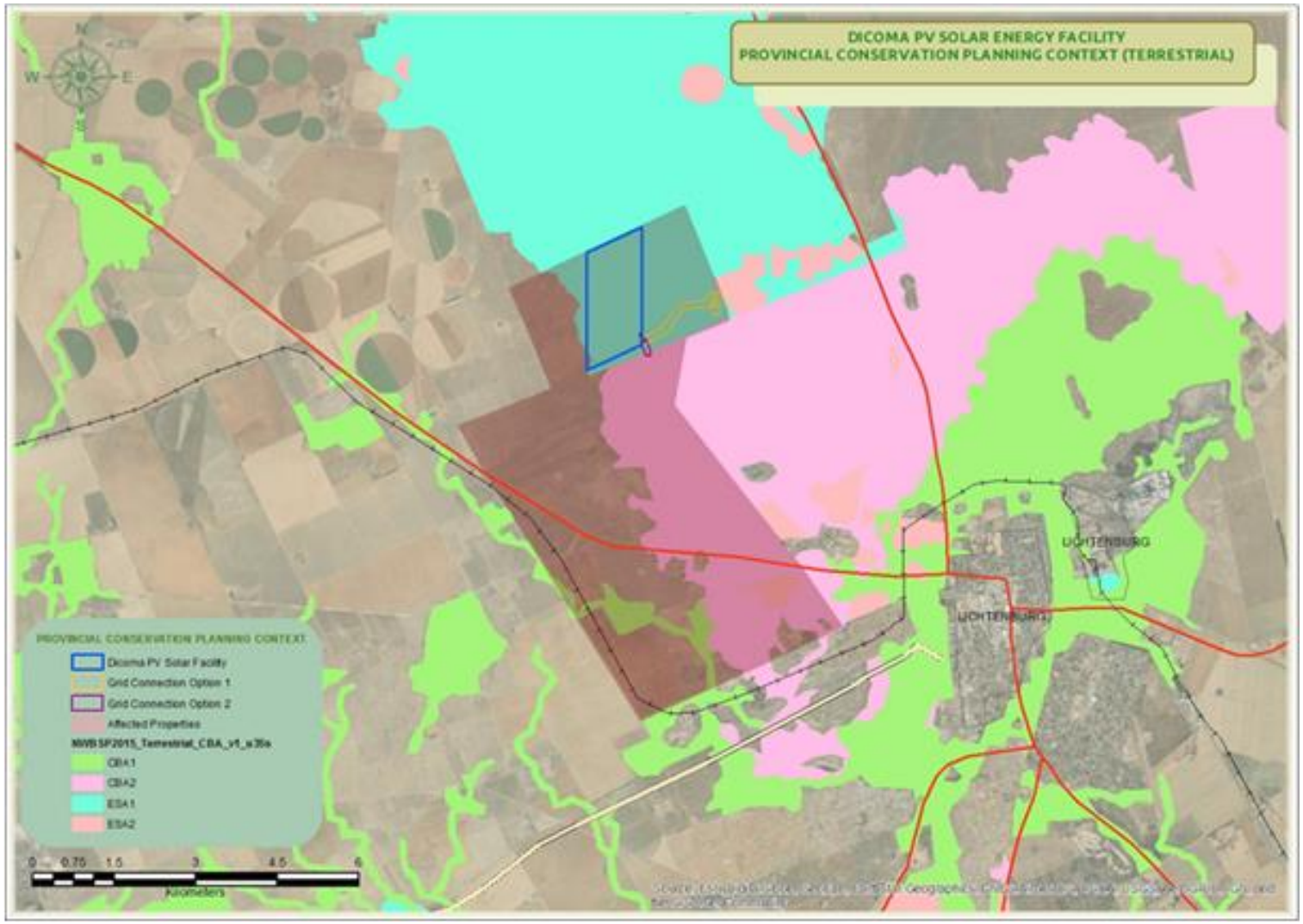


Figure 6.7: Map illustrating ESA1 (NWBSP,2015) within the Dicoma PV Facility site

vi. Freshwater Features

The study area is situated within the Lower Vaal Water Management Area (WMA) 10, Quaternary Catchment C31A (Harts River Catchment) and Ecoregion 11.01 (Highveld Ecoregion). The Lower Vaal WMA is located downstream of Bloemhof Dam and upstream of Douglas Weir. It extends to the headwaters of the Harts, Molopo and Kuruman River in the north and the Vaal River Downstream of Bloemhof Dam in the south. It covers a catchment area of 51 543km^2. It lies in the North West and Northern Cape Provinces, with the south-eastern corner in the Free State, and borders on Botswana to the north, as well as on the Crocodile (West) and Marico, Middle Vaal, Upper Orange and Lower Orange water management areas. Major rivers in this WMA include the Molopo, Harts, Dry Harts, Kuruman and Vaal River. As a result of the low rainfall, flat topography and sandy soils occur over much of the WMA, and little usable surface runoff is generated in the WMA.

The study area is situated approximately 7.4 km north west of the Klein Harts River and other tributaries of the Harts River, which forms the most important surface hydrological feature of the region. Generally surface water within the Lichtenburg area is scarce with very few of the watercourses or pans having perennial water.

In terms of the NFEPA (2011) and the NBAs 2018 National Wetlands Map 5 no wetlands or freshwater/watercourse features are located within the project site and within the 500m regulated area.. Following a desktop mapping exercise and a screening site-visit it was confirmed that no freshwater resource features are located within the project site or within close proximity to the site.

6.4.4. Avifauna profile for the area

The development area is located approximately 3km west of the Lichtenburg Game Breeding Centre. This conservation area contains a variety of game species, and the facility used to operate a vulture restaurant which attracts foraging vultures (three species) to the region.

There are no other formal protected areas or any Important Bird and Biodiversity Areas in close proximity to the development area. There are supporting avifaunal habitat within the development area (**Figure 6.8 and Figure 6.9),** and this includes:

» ***Open mixed dolomite grassland with bush clump mosaics:***
It is occupied by a typical grassland bird composition dominated by insectivorous and granivore passerine bird species such as Desert Cisticola, (*Cisticola aridulus*), Eastern Clapper Lark (*Mirafra fasciolata*) (Melodious Lark (*Mirafra cheniana*), Spike-heeled Lark (*Chersomanes albofasciata*), Cape Longclaw (*Macronyx capense*), Ant-eating Chat (*Myrmecocichla formicivora*) and African Pipit (*Anthus cinnamomeus*). Prominent non-passerine species include Orange River Francolin (*Scleroptila gutturalis*), Swainson's Spurfowl (*Pternistis swainsonii*), Northern Black Korhaan (*Afrotis afraoides*), Crowned Lapwing (*Vanellus coronatus*) and Black-winged Kite (*Elanus caeruleus*).

» **Mixed open woodland**
The tall vertical heterogeneity assists with the colonisation of a "Bushveld" bird association consisting of mainly insectivorous passerines. Other noteworthy species include Crested Barbet (*Trachyphonus vaillantii*), Crimson-breasted Shrike (*Laniarius atrococcineus*) and Common Scimitarbill (*Rhinopomastus cyanomelas*).

» **Artificial livestock watering points**

These are represented by artificial water troughs and reservoirs with the purpose to provide drinking water to livestock. However, they act as focal congregation areas for many granivore passerine and non-passerine species, including Cape Sparrow (*Passer melanurus*), Laughing Dove (*Spilopelia senegalensis*), Namaqua dove (*Oena capensis*), Scaly-feathered Weaver (*Sporopipes squamifrons*) and Wattled Starling (*Creatophora cinerea*).

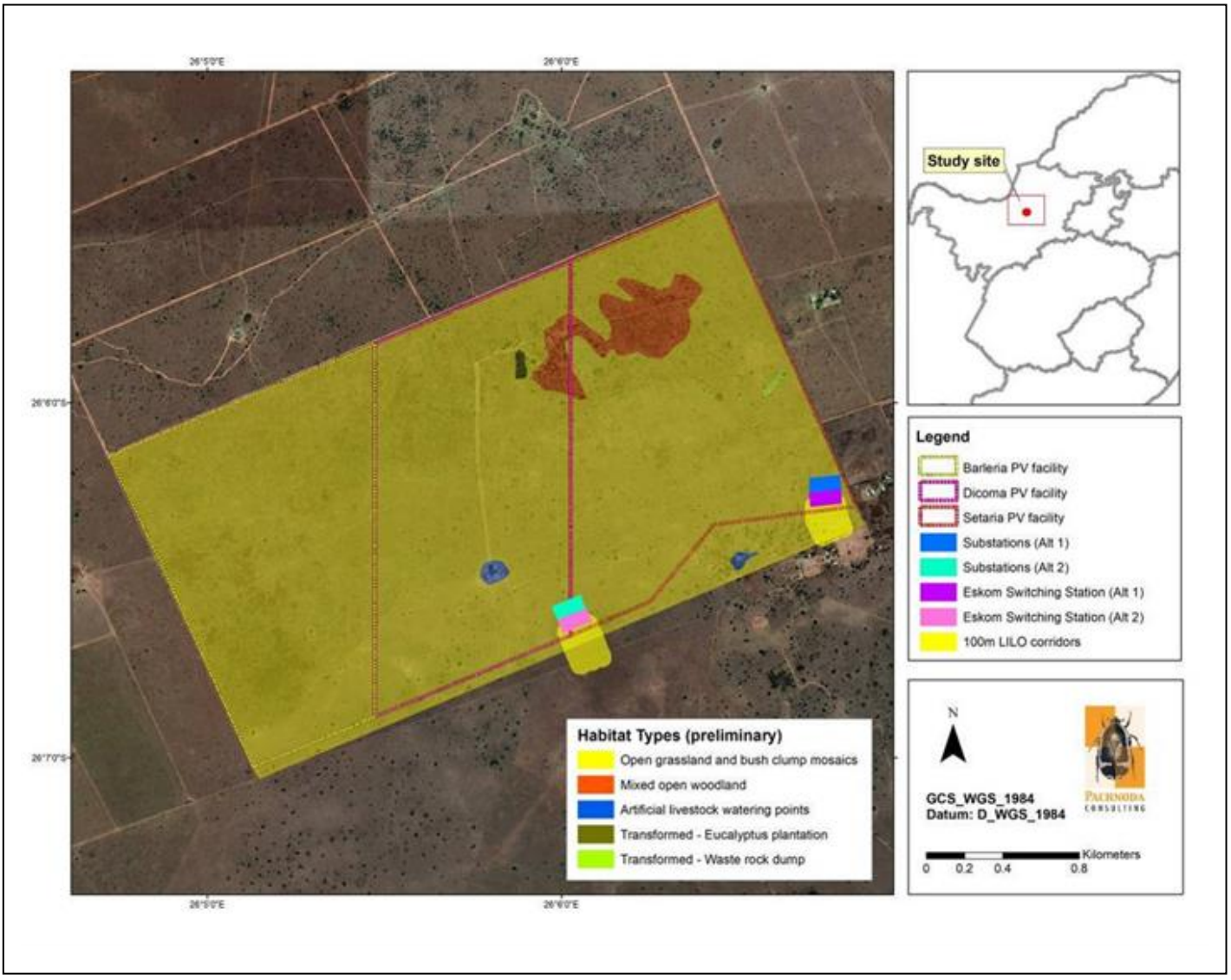


Figure 6.8: A habitat map illustrating the important avifaunal habitat types on the study site

Figure 2.9: A collage of images illustrating examples of avifaunal habitat types (open mixed dolomite grassland and bush clumps mosaic, mixed open woodland and artificial livestock watering points and Eucalyptus) on the study site observed during the austral winter season (August 2021)

» ***Avian species richness and predicted summary statistics***

Approximately 200 bird species are expected to occur on the study site and immediate surroundings (refer to **Table 6.5**). The expected richness was inferred from the South African Bird Atlas Project (SABAP1 & SABAP2) and the presence of suitable habitat in the study area. The expected richness is also strongly correlated with favourable environmental conditions (e.g. during good rains) and seasonality (e.g. when migratory species are present). This equates to 20% of the approximate 985[22] species listed for the southern African subregion[23] (and approximately 23 % of the 857 species recorded within South Africa[24]). However, the total species richness obtained from the pentad grid 2605_2605 corresponding to the study site contained 179 species, with an average number of 48 species for each full protocol card submitted (for observation of two hours or more). According to personal observations, the average number of species observed on the study site is *ca*. 70 species (obtained during the austral winter season of August 2021).

As indicated in **Table 6.5**, the study site is poorly represented by biome-restricted[25] (refer to **Table 6.6**) and local endemic bird species. It does support *ca*. 30% of the near -endemic species present in the subregion. Prominent wetland features and waterbodies are absent from the study site, thereby explaining the absence and low richness of waterfowl, wading birds and shorebird taxa.

Table 6.5: A summary table of the total number of species, Red listed species (according to Taylor et al., 2015 and the IUCN, 2021), endemics and biome-restricted species (Marnewick et al., 2015) expected (*sensu* SABAP1 and SABAP2) to occur in the study site.

Description	Expected Richness Value
Total number of species	198 (23 %)
Number of Red Listed species*	11 (8 %)
Number of biome-restricted species – Zambezian and Kalahari-Highveld Biomes)	3 (21 %)
Number of local endemics (BirdLife SA, 2018)	2 (5 %)
Number of local near endemics (BirdLife SA, 2018)	7 (23 %)
Number of regional endemics (Hockey *et al.,* 2005)	16 (15 %)
Number of regional near endemics (Hockey *et al.,* 2005)	21 (34 %)

only species in the geographic boundaries of South Africa (including Lesotho and Swaziland) were considered.
only species in the geographic boundaries of southern Africa (including Namibia, Botswana, Zimbabwe and Mozambique south of the Zambezi River) were considered
Percentage values in brackets refer to totals compared against the South African avifauna (*sensu* BirdLife SA, 2018).

Table 6.6: Expected biome-restricted species (Marnewick *et al*, 2015) likely to occur on the study site.

Species	Kalahari-Highveld	Zambezian	Expected Frequency of occurrence

22 *sensu* www.zestforbirds.co.za (Hardaker, 2020)
23 A geographical area south of the Cunene and Zambezi Rivers (includes Namibia, Botswana, Zimbabwe, southern Mozambique, South Africa, Swaziland and Lesotho).
24 With reference to South Africa (including Lesotho and Swaziland (BirdLife South Africa, 2018).
25 A species with a breeding distribution confined to one biome. Many biome-restricted species are also endemic to southern Africa.

Kalahari Scrub-robin (*Cercotrichas paena)*	X		Common
White-throated Robin-chat (*Cossypha humeralis*)		X	Common
White-bellied Sunbird (*Cinnyris talatala*)		X	Common

» ***Bird species of conservation concern***

Table 6.7 provides an overview of bird species of conservation concern that could occur on the study site based on their historical distribution ranges and the presence of suitable habitat. A total of 11 species could occur on the study site which includes six globally threatened species, one globally near threatened species, two regionally threatened species and two regionally near-threatened species.

It is evident from **Table 6.7** that the highest reporting rates (>5%) were observed for the globally endangered Cape Vulture (*Gyps coprotheres*) and the globally critically endangered White-backed Vulture (*Gyps africanus*). These species have a high likelihood of occurrence pending the presence of suitable food (livestock carcasses). The regionally vulnerable Lanner Falcon (*Falco biarmicus*), globally endangered Lappet-faced Vulture (*Torgos tracheliotos*) and globally near threatened Red-footed Falcon (*Falco vespertinus*) show reporting rates between 2% and 5 %. These species have a moderate probability of occurrence and are regarded as occasional foraging visitors to the area.

The remaining species have low reporting rates (<2%) and are regarded as irregular foraging visitors with low probabilities of occurrence. However, during the site survey it was noticed that extensive areas of suitable foraging habitat persist for some of these species (e.g. Secretarybird *Sagittarius serpentarius*) despite being ominously absent from the area. It is possible that the low reporting rates reflect the poor coverage of the study area by citizen scientists (e.g., birdwatchers), and some of these species could occur in higher numbers due to being overlooked. As an example, Red-footed Falcons (*F. vespertinus*) often occur in flocks of the similar-looking Amur Falcon (*F. amurensis*), which based on reporting rates appear to be a common summer visitor to the area. Therefore, it is highly possible that Red-footed Falcons were previously overlooked or misidentified.

Both White-backed Vulture (*Gyps africanus*) and Lappet-faced Vulture (*Torgos tracheliotos*) were confirmed feeding on a calf carcass during the July 2018 austral winter site survey. In addition, two Cape Vultures (*G. coprotheres*) were also confirmed soaring overhead during the July 2018 austral winter site survey.

Table 6.7: Bird species of conservation concern that could utilise the study site based on their historical distribution range and the presence of suitable habitat. Red list categories according to the IUCN (2021) and Taylor et al. (2015).

Species	Global Conservation Status*	National Conservation Status**	Mean Reporting rate: SABAP1 (n=142)	Mean Reporting rate: SABAP2 (n=64)	Preferred Habitat	Potential Likelihood of Occurrence
Anthropoides paradiseus (Blue Crane)	Vulnerable	Near threatened	47.18	-	Prefers open grasslands. Also forages in wetlands, pastures and agricultural land.	Potential vagrant or highly irregular foraging visitor.

Species	Global Conservation Status*	National Conservation Status**	Mean Reporting rate: SABAP1 (n=142)	Mean Reporting rate: SABAP2 (n=64)	Preferred Habitat	Potential Likelihood of Occurrence
Aquila rapax (Tawny Eagle)	Endangered-	Endangered	2.11	-	Lowveld and Kalahari savannas, especially game farming areas and reserves	An irregular visitor or vagrant to the study site.
Ciconia abdimii (Abdim's Stork)	-	Near threatened	7.75	-	Open stunted grassland, fallow land and agricultural fields.	An uncommon summer foraging visitor to areas consisting of secondary grassland or arable land.
Falco vespertinus (Red-footed Falcon)	Near threatened	Near threatened	2.11	3.13	Varied, prefers to hunt open arid grassland and savannoid woodland, often in company with Amur Falcons (F. amurensis).	An occasional summer foraging visitor to the area.
Falco biarmicus (Lanner Falcon)	-	Vulnerable	2.82	9.1 (for pentad 2605_2605)	Varied, but prefers to breed in mountainous areas.	An occasional foraging visitor to the study area.
Gyps coprotheres (Cape Vulture)	Endangered	Endangered	17.16	9.1 (for pentad 2605_2605)	Mainly confined to mountain ranges, especially near breeding site. Ventures far afield in search of food.	A regular foraging/scavenging visitor to the study site pending the presence of food (e.g. livestock carcasses).
Gyps africanus (White-backed Vulture)	Critically Endangered	Critically Endangered	16.18	4.5 (for pentad 2605_2605)	Breed on tall, flat-topped trees. Mainly restricted to large rural or game farming areas.	A regular foraging/scavenging visitor to the study site pending the presence of food (e.g. livestock carcasses).
Leptoptilos crumeniferus (Marabou Stork	-	Near threatened	0.70	1.56	Varied, from savanna to wetlands, pans and floodplains – dependant of game farming areas	An irregular scavenging visitor to the area.

Species	Global Conservation Status*	National Conservation Status**	Mean Reporting rate: SABAP1 (n=142)	Mean Reporting rate: SABAP2 (n=64)	Preferred Habitat	Potential Likelihood of Occurrence
Polemaetus bellicosus (Martial Eagle)	Endangered	Endangered	-	4.5 (for pentad 2605_2605)	Varied, from open karroid shrub to lowland savanna.	An irregular foraging visitor. It was last recorded from pentad 2605_2605 south of the study site on 28 Jan 2012.
Sagittarius serpentarius (Secretarybird)	Endangered	Vulnerable	2.45	1.56	Prefers open grassland or lightly wooded habitat.	Regarded as an irregular foraging visitor to the study site despite the widespread presence of suitable foraging habitat.
Torgos tracheliotos (Lapped-faced Vulture)	Endangered	Endangered	5.63	4.69	Lowveld and Kalahari savanna; mainly on game farms and reserves	A regular foraging/scavenging visitor to the study site pending the presence of food (e.g. livestock carcasses).

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

6.5.1. Historical, Archaeological and Built Environment Heritage

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, more and more 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 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.

The study area was previously assessed by Van der Walt (2014) where it was noted that most of the Stone Age archaeology in the study area consists of low densities of scattered (and possibly mixed) MSA and LSA artefacts. These find spots are documented as "occurrences" and are of low significance but more substantial and higher density scatters of MSA material do occur and were recorded as "sites". The archaeological sites are described as "Medium density scatters of tools, blades, flakes, cores, MSA mainly of chert. " and are graded IIIC i.e. low local significance. Van der Walt (2014) also identified a single unmarked grave (approximately 27 years old) and farm labour housing dating to the 1990's. He further noted that "Cultural landscape elements were noted in the northern portion of the study area consisting of the mentioned farm labourer dwelling together with a windmill, stone walled cattle kraal and a recently constructed kraal." (Van der Walt, 2014).

The field assessment 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 behavioral 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.

6.5.2. Palaeontology

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. 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 intertidal stromatolites (domes, columns *etc*) and organic-walled microfossils. In addition, it is within this group that fossiliferous Late Cenozoic cave breccias have been identified such as within the Cradle of Humankind region. The project area lies on rocks of the Malmani Subgroup, Chuniespoort Group. According to Bamford (2018), the Malmani Subgroup is up to 2000m thick and comprises five formations distinguished by the amount of chert, stromatolite morphology, intercalated 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 is the Monte Christo Formation comprising 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.

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.

6.6 Social Context

Table 6.8 provides a baseline summary of the socio-economic profile of the Ditsobotla Local Municipality within which Dicoma PV 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 6.8: Baseline description of the socio-economic characteristics of the area proposed for Dicoma PV

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.

6.7 Visual Quality

The visual quality of the project site and the broader study area is defined by the following characteristics:

- The project site is in an area that has a distinct rural and agricultural character, with some mining/quarrying activity located south-east of the proposed development site at a distance of 5km at the closest.
- The dominating terrain morphology of the study area is 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 a very gradual drop (from the northern section of the study area to the Die Vlei River which flows through Lichtenburg.
- Maize farming (both dryland and irrigated agriculture), with some mining/quarrying activity dominates the land use character in the south-east part of the study area.
- A great number of power lines, associated with this substation, are located south and north of the site.

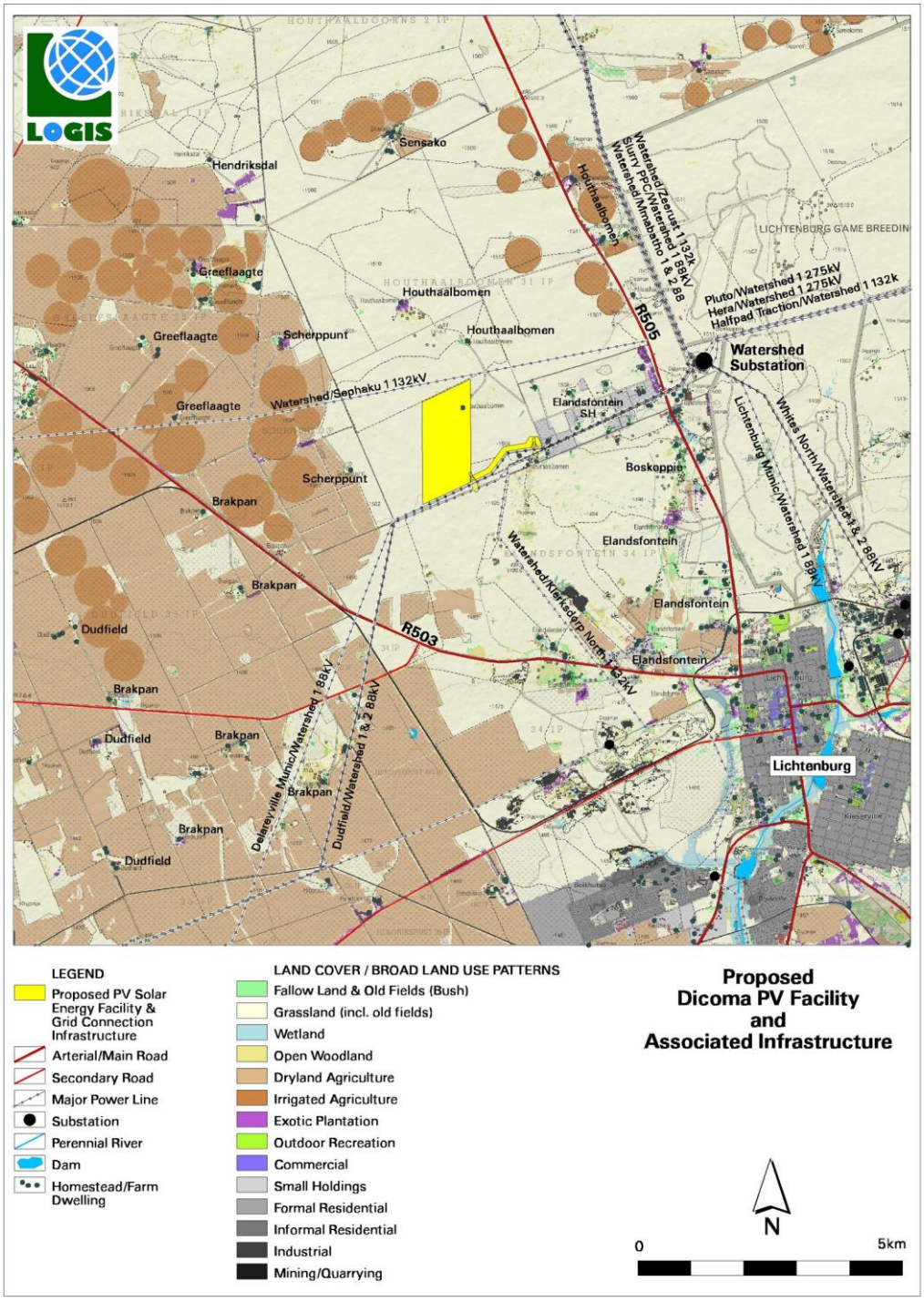


Figure 6.10. Land cover and broad land use patterns of the area surrounding the Dicoma PV facility

6.7.1 Settlement and infrastructure

Farm settlements or residences occur at irregular intervals throughout the project site. Some of these, in close proximity to the project site, include: *Houthaalbomen, Boskoppie, Elandsfontein, Brakpan, Scherppunt, Greeflaagte*, etc. The Elandsfontein small holdings are located east of the identified development area.

Site specific settlement and infrastructure.

The project site is currently not occupied, and it is used for mainly agricultural purposes such as livestock farming, and the land has never been used for rainfed or irrigated crop production. There is also no irrigation infrastructure, such as centre pivots or drip irrigation, present within the project site.

Access to the project site will be via the secondary (gravel) District Road (D2435) that joins the R505 arterial road near the Watershed Substation, located to the east of the site.

CHAPTER 7: ASSESSMENTS 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 Dicoma PV and its associated infrastructure. This assessment has considered the construction of a PV facility with a contracted capacity of up to 75MW with a development footprint of approximately 175ha. The project will comprise the following key infrastructure and components:

» PV modules and mounting structures
» Inverters and transformers
» BESS, Construction and O&M hub, including:
  - Battery Energy Storage System (BESS)
  - Temporary and permanent laydown area
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage
» Site and internal access roads (up to 8m wide)
» Grid connection solution within a 100m wide corridor, including:
  - 33kV cabling between the project components and the facility substation
  - A 132kV facility substation
  - A 132kV Eskom switching station
  - A Loop-in-Loop out (LILO) overhead 132kV power line between the Eskom switching station and the existing Delareyville Munic–Watershed 1 88kV power line[26].

Two alternative grid connection configurations have been considered for the proposed project and include:

Grid Connection Alternative 1: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other approximately 1.3km east of the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV[27] . The grid connection infrastructure is located within an assessment corridor 100m in width.

Grid Connection Alternative 2: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other and infringes on the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV. The grid connection infrastructure is located within an assessment corridor of 100m in width.

[26] The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

27 The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

A comparative assessment of the alternatives for the project is undertaken as part of the impact assessment in order to identify the preferred alternatives from an environmental perspective.

The full extent of the project site was considered through the EIA phase by the independent specialists and the EAP. On-site sensitivities were identified through the review of existing information, desk-top evaluations and field surveys. A development footprint for the PV facility within the project site was proposed by the developer through consideration of the sensitive environmental features and areas identified through the EIA process. **Figure 7.1** illustrates the Dicoma PV facility development area, including the grid connection alternatives.

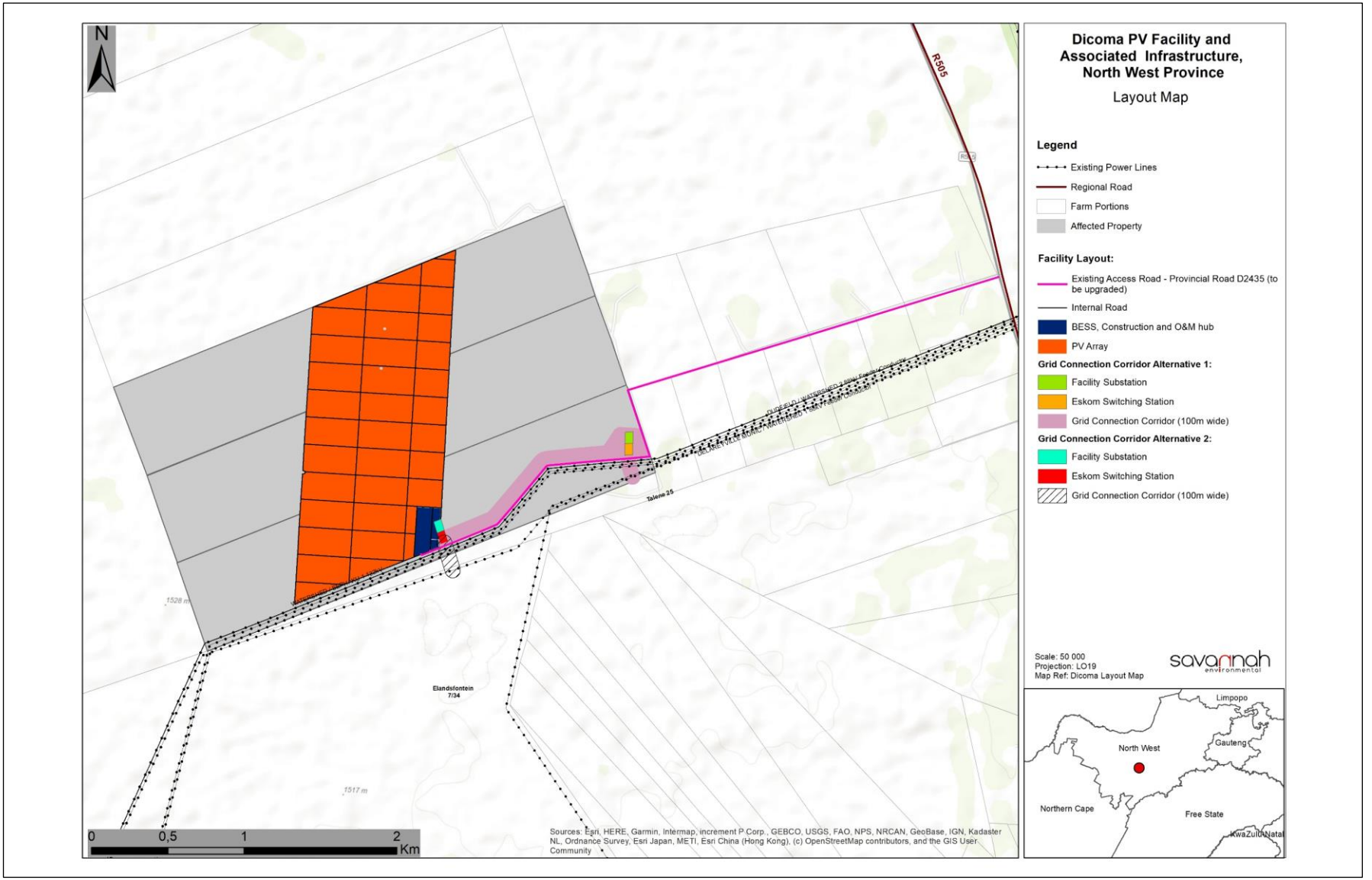


Figure 7.1: Map of the proposed Dicoma PV facility development area and grid connection alternatives (refer to **Appendix O** for A3 map).

The development of Dicoma PV will comprise the following phases:

- *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads, laydown areas, and facility infrastructure (including PV panels and BESS); construction of foundations involving excavations; the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase is estimated at 12 - 18 months.
- *Operation* – will include the operation of the PV facility and the generation of electricity, which will be fed into the national grid via the facility on-site substation and an overhead power line. The operation phase is expected to be approximately 20 years (with maintenance).
- *Decommissioning* – depending on the economic viability of the PV facility, the length of the operation phase may be extended beyond a 20 year period. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the PV facility, clearance of the relevant infrastructure at the site and appropriate disposal thereof, and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities. Therefore, these impacts are not considered separately within this chapter.

Environmental impacts associated with construction and decommissioning activities may include, among others, threats to biodiversity and ecological processes, including habitat alteration and impacts to fauna, avifauna and flora, impacts to sites of heritage value, soil contamination, erosion and loss of agricultural land, nuisance from the movement of vehicles transporting equipment and materials, and loss of income from agricultural land .

Environmental impacts associated with the operation phase includes soil contamination, erosion and potential invasion by alien and invasive plant species. Other impacts include visual impacts and night time lighting impacts.

From the specialist studies undertaken, the following aspects do not require any further assessment:

Freshwater/wetland assessment
In terms of the NFEPA (2011) and the NBAs 2018 National Wetlands Map 5 no wetland or watercourse features are located within the project site as well as within the 500m regulated area of a wetland. It has been concluded that no surface freshwater resource features will be impacted by the Dicoma PV facility development and as such further assessments relating to freshwater resource features were not relevant or required.

Cultural Landscape
As per the heritage screening assessment, it was concluded that the area proposed for development has not been identified as part of a special or recognised cultural landscape and as such, no further assessment of impacts to the cultural landscape was relevant or required.

7.1. Quantification of Areas of Disturbance on the Site

Site-specific impacts associated with the construction and operation of Dicoma PV relate to the direct loss of vegetation and species of special concern, disturbance of animals (including avifauna) and loss of habitat, and impacts to soils. In order to assess the impacts associated with Dicoma PV facility, it is necessary to understand the extent of the affected area.

- The project site being assessed for Dicoma PV requires an area of approximately 179ha of which the proposed infrastructure will occupy an area of approximately 175ha in extent. This area includes infrastructure such as PV modules and mounting structures, Inverters and transformers, BESS, temporary and permanent laydown area, site offices and maintenance buildings, including workshop areas for maintenance and storage and site and internal access roads.
- The grid connection solution includes additional infrastructure, including a grid line servitude (up to 36m in width, with the towers required to support line up to 24m in height); on-site substation (footprint area up to 1ha in extent) and Eskom switching station (footprint area up to 1ha in extent).

7.2. Potential Impacts on Ecology (Ecology, Flora and Fauna)

The majority of the ecological impacts associated with the development would occur during the construction phase as a result of the disturbance associated with site clearance, excavations, the operation of heavy machinery at the site and the presence of construction personnel. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details).

7.2.1 Results of the Ecological Impact Assessment

The entire Dicoma PV project site has been identified as being of a low to medium ecological sensitivity based on the following:

Plant Habitat Sensitivity

Searsia pyroides – Elionurus muticus Savanna-Grassland

- This primary grassland is located within the southern portion of the project site. This vegetation community has been impacted by historical overgrazing; however, the vegetation cover has since stabilised and comprise moderate dense grass coverage. Thus, this vegetation community is in a moderately modified ecological condition (Present Ecological State – PES) and has undergone a moderate change in ecosystem processes. Furthermore, a loss of natural habitat has taken place but the natural habitat remains predominantly intact.
- Plant community which is representative of Carletonville Dolomite Grassland which is listed as Least Concern.
- Plant diversity within this vegetation community is fairly high.
- No plant Species of Conservation Concern(SCC) have been recorded.
- Localised occurrence of protected species (*Vachellia erioloba and Schizocarphus nervosus*)
- Furthermore, the western portion of this vegetation community forms part of an ESA.
- Based on the above-mentioned characteristics this vegetation community is of medium importance in terms of its conservation status.
- Due to species composition and structural variation within this vegetation community, potential faunal niche diversity can be regarded as moderate.
- Furthermore, the stable vegetation cover:
  - maintains the functionality of the soil,
  - provide a food resource for fauna,
  - limit the loss of water resources, and
  - prevent degradation of the ecosystem

Senegailia hereroensis – Triraphis andropogonoides Savanna-Grassland

- This primary grassland is located within the northern portion of the project site. This vegetation community has been slightly impacted by understocking and has resulted in the dominance of Increaser I, Climax grasses. However, the vegetation is in a stable condition. Therefore, this vegetation community is in a

largely natural ecological condition (Present Ecological State – PES) with a slight change in ecosystem processes. Furthermore, only a small loss of natural habitat and biota may have taken place.

- Plant community which is representative of Carletonville Dolomite Grassland which is listed as Least Concern.
- In terms of species and structural composition this vegetation community is a fairly unique variation of the Carletonville Dolerite Grassland.
- Plant diversity within this vegetation community is high.
- No Plant Species of Conservation Concern(SCC) have been recorded.
- Localised occurrence of protected species (*Vachellia erioloba, Babiana hypogea, Gladiolus spp. and Schizocarphus nervosus*)
- Furthermore, the western portion of this vegetation community forms part of an ESA.
- Based on the above-mentioned characteristics this vegetation community is of medium-high importance in terms of its conservation status.
- Due to species composition and structural variation within this vegetation community, potential faunal niche diversity can be regarded as moderate-high.
- Furthermore, the stable vegetation cover;
    - maintains the functionality of the soil,
    - provide a food resource for fauna,
    - limit the loss of water resources, and
    - prevent degradation of the ecosystem

Hyparrhenia hirta – Eragrostis lehmanniana Secondary Grassland

- This is a plagioclimax grassland (secondary grassland) that has established and stabilised on old cultivated areas (<30years). Thus, this vegetation community is in a largely modified ecological condition (Present Ecological State – PES) and has undergone a large change in ecosystem processes. Furthermore, a loss of natural habitat and biota have occurred, however some establishment of habitat and return of biota have occurred over time.
- Plant community which is representative of a degraded form of Carletonville Dolomite Grassland which is listed as Least Concern.
- Plant diversity within this vegetation community is moderate to low with the dominant species being mostly generalists and weeds, typical of degraded habitats.
- No Plant Species of Conservation Concern(SCC) have been recorded.
- Localised occurrence of protected species (*Vachellia erioloba, Babiana hypogea* and *Schizocarphus nervosus*)
- The western portion of this vegetation community forms part of an ESA.
- Based on the above-mentioned characteristics this vegetation community is of low importance in terms of its conservation status.
- Even though, this vegetation community has disturbed in the past, a fairly stable vegetation cover has re-established within the area, allowing for some functions and services to return
- Due to the fairly low species composition and structural variation within this vegetation community, potential faunal niche diversity can be regarded as low.
- Furthermore, the stable vegetation cover;
    - ensures stability of the soil,
    - enhances moisture retention,
    - slows down runoff;
    - increases water infiltration;
    - prevents the establishment and proliferation of invasive alien plants
    - provide a grazing habitat for fauna,

Faunal Habitat Sensitivity

» Wooded Grassland (*Senegalia hereroensis* variation)

This habitat is the smallest habitat within the project site (located to the north), but contains the highest faunal and flora diversity.

These habitat shows good potential for mammal and reptile species. This habitat provides good refugia (moderate structural complexity) and forage, especially for small mammal species, which in turn form the basis for the trophic food chain. The grasses in this habitat are dense but is of a fair to poor forage value. Species diversity within these habitats were fairly moderate, with most of the species recorded, regarded as habitat generalists. Connectivity with similar habitats as well as other habitats are regarded as good. Thus, overall diversity, connectivity and sensitivity of this habitat can be regarded as **Moderate**.

» Wooded Grassland (*Searsia pyroides* variation)

These habitat shows a fair potential for mammal and reptile species.

This habitat provides moderate to relative good refugia and forage for small mammal species, which in turn form the basis for the trophic food chain. The grasses in this habitat is moderately dense and of fair to poor forage value. Positive effects are from moderate structural complexity and fairly strong foraging potential and overall, the species diversity for this area was moderate-low, with species from most trophic levels present. Most of the species recorded within this habitat type can be regarded as habitat generalists.

Overall diversity, connectivity and sensitivity of these areas can be regarded as **Moderate**.

» Secondary Grassland (*Hyparrhenia hirta* grassland)

This is a plagioclimax grassland that has established on old cultivated lands. This grassland comprise of a fairly low diversity of plants and the structural complexity of this grassland can be regarded as low. Although the grass layer was moderately dense, the fairly species poor nature of the habitat reduces habitat and foraging potential in comparison with the above described habitats. The softer substrate is however more optimal for fossorial or burrowing species such as mole rats, mongooses, Suids (pig species) and porcupines.

The overall diversity, connectivity and sensitivity of these areas were **Low.**

The relevant sensitivities of the project site as determined are presented in **Figure 7.2** .

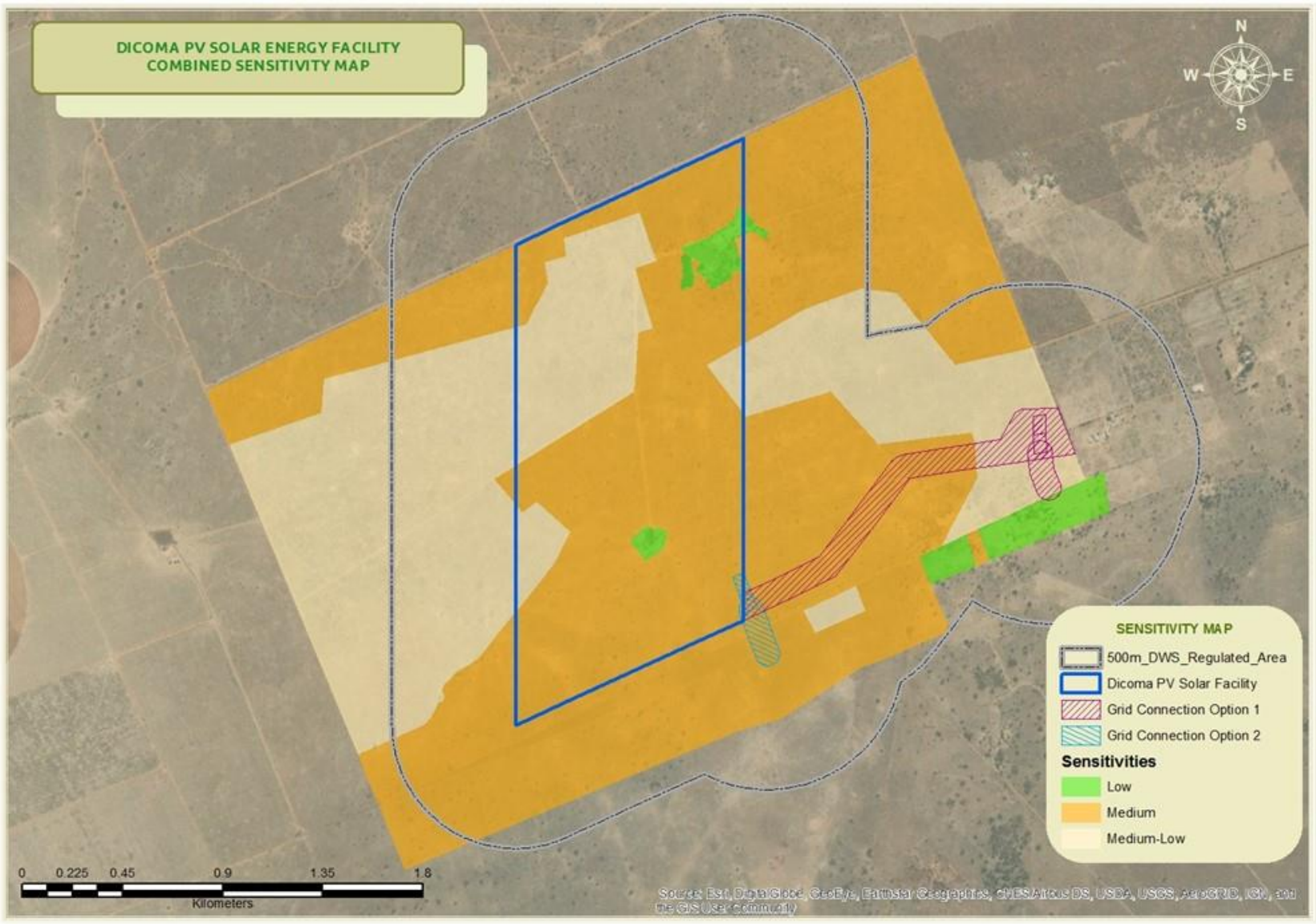


Figure 7.2: Combined ecological sensitivity map for the Dicoma PV site, including the power line corridor alternatives

7.2.2 Description of Ecological Impacts

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

Construction Phase Impacts

- Human presence and uncontrolled access to the site may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purpose.
- Site clearing and exploration activities for site establishment.
- Vegetation clearing could impact listed plant species. Vegetation clearing would also lead to the loss of vegetation communities and habitats for fauna and avifauna and potentially the loss of faunal as well as avifaunal species, habitats and ecosystems. On a larger and cumulative scale (if numerous and uncontrolled developments are allowed to occur in the future) the loss of these vegetation communities and habitats may potentially lead to a change in the conservation status of the affected vegetation type as well as the ability of this vegetation type and associated features to fulfil its ecological responsibilities (functions). The above impact is most likely to be low due to the fact that most of the development area is situated within an area which has been largely historically transformed through cultivation practices, and long-term grazing pressure. Only limited elements of original/natural (primary) Carletonville Dolomite Grassland remain within the proposed project site and the proposed development will not impact conservation targets set out for this vegetation type. It is expected that the impact will be mostly local (concentrated within the proposed development area and within the immediate surrounding areas).
- Soil compaction and increased erosion risk would occur due to the loss of plant cover and soil disturbance created during the construction phase. This may potentially impact the downstream watercourses, wetlands and aquatic habitats, mainly due to an increase of surface water and silt inflow from the surrounding disturbed areas. These potential impacts may result in a reduction in the buffering capacities of the landscape during extreme weather events.
- Invasion by alien plants may be attributed to excessive disturbance to vegetation, creating a window of opportunity for the establishment of these alien invasive species. In addition, regenerative material of alien invasive species may be introduced to the project site by machinery traversing through areas with such plants or materials that may contain regenerative materials of such species.
- Presence and operation of construction machinery on the project site. This will create a physical impact as well as generate noise, potential pollution and other forms of disturbance at the site.
- Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.

Operation Phase impacts

- The facility will require management and if this is not done effectively, it could impact adjacent intact areas through impacts such as erosion and the invasion of alien plant species.

Decommissioning Phase impacts

- The potential ecological impacts will be very similar to that of the construction phase

During both the construction and operation phases human presence and uncontrolled access may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purposes.

The impacts assessed below apply to the project site and all alternatives proposed and assessed for Dicoma PV.

7.2.3 Impact tables summarising the significance of impacts on ecology related to the PV facility, substations and the grid line during construction and operation (with and without mitigation)

Impact: Potential impacts on vegetation and listed or protected plant species.
Nature: Impacts on vegetation and listed or protected plant species would occur due to the construction of the facility and associated infrastructure. This impact is regarded as the most likely and significant impact and may lead to direct loss of vegetation including listed and protected species. The most likely consequences include:

- local loss of habitat (to an extent as a natural ground covering will be maintained where possible);
- very small and local disturbance to processes maintaining local biodiversity and ecosystem goods and services;
- a potential loss of a few local protected species.

The development footprint itself is primarily homogenous in terms of habitat types and vegetation cover, therefore providing for easier and more accurate calculation of potential impacts, more effective recommendations and implementation of management and mitigation measures, and furthermore lowering the impact.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (2)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (44)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- Preconstruction walk-through of the final development footprint for protected species that would be affected and that can be translocated.
- Since a large proportion of the identified protected species at the site are geophytic (e.g. *Babiana hypogea, Schizocarphus nervosus* and *Gladiolus spp.*), the potential for successful translocation is high. Before construction commences individuals of listed species within the development footprint that would be affected, should be counted and marked and translocated where deemed necessary by the ecologist conducting the pre-construction walk-through survey, and according to the recommended ratios. Permits from the relevant provincial authorities, will be required to relocate and/or disturb listed plant species.
- Any individuals of protected species affected by and observed within the development footprint during construction should be translocated under the supervision of the ECO and/or Contractor's Environmental Officer.
- Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc.
- Demarcate all areas to be cleared with construction tape or similar material where practical. However, caution should be exercised to avoid using material that might entangle fauna.
- ECO and/or Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.
- Ensure that laydown areas, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible.
- All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas should be allowed.
- Regular dust suppression during construction, if deemed necessary, especially along access roads.
- No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without express permission from the ECO and or Contractor's EO.

» No fires should be allowed on-site.

Residual Impacts:
Due to the shade effect of the solar panels some transformation of vegetation is likely to occur underneath the panels. As this area is already, to some extent, in a transformed state, further transformation due to the shading effect is not likely to be significant. However, any transformations caused by the development will take a very long time to restore and as such is regarded as a residual impact.

Impact: Direct faunal impacts
Nature: Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during construction.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Low (15)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Noise and disturbance during the construction, decommission and during maintenance phases cannot be avoided but would be transient in nature and with appropriate mitigation; no long-term impacts from the construction phase can be expected.	

Mitigation:
» Site access should be controlled and no unauthorised persons should be allowed onto the site.
» Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person.
» The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site.
» Fires should not be allowed on site.
» All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
» All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises.
» Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).

Residual Impacts:
The altered development area will contain a lower diversity of habitat types and niches for faunal species, however faunal diversity was in any way confirmed to be limited and as such this potential residual impact can be regarded as low.

Impact: Soil erosion and associated degradation of ecosystems
Nature: During construction/decommission, there will be a lot of disturbed and loose soil at the site which will render the area vulnerable to erosion. Erosion is one of the greatest risk factors associated with the development and it is therefore of critical importance that proper and adequate erosion control structures are designed, built and maintained over the lifespan of the project.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)

Duration	Medium-term (3)	Short-term (1)
Magnitude	Moderate (7)	Minor (3)
Probability	Highly Probable (4)	Probable (3)
Significance	High (40)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Low – if erosion has reached severe levels the impacts will not be remedied easily	High
Irreplaceable loss of resources?	Potential loss of important resources.	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- Any erosion problems observed along access roads or any hardened/engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur.
- All bare areas (excluding agricultural land and the development footprint), affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable.
- Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible.
- Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.
- Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.
- Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.

Residual Impacts:
The loss of fertile soil and soil capping resulting in areas which cannot fully rehabilitate itself with a good vegetation cover. With appropriate avoidance and mitigation residual impacts will be very low.

Impact: Alien plant invasion
Nature: Increased alien plant invasion is one of the greatest risk factors associated with this development. The disturbed and bare ground that is likely to be present at the site during and after construction would leave the site vulnerable to alien plant invasion for some time if not managed. Furthermore, the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as well as the Conservation of Agricultural Resources Act, (Act No. 43 of 1983) requires that listed alien species are controlled in accordance with the Act.

	Without mitigation	With mitigation
Extent	Local - Regional (3)	Local (1)
Duration	Permanent (5)	Short-term (1)
Magnitude	Moderate (6)	Minor (4)
Probability	Definite (5)	Probable (3)
Significance	High (70)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	Potential loss of important resources due to the replacement of natural vegetation by invading alien plants	No
Can impacts be mitigated?	Yes	

Mitigation:

- A site-specific eradication and management programme for alien invasive plants must be included in the Environmental Management Programme (EMPr).

- » Regular monitoring by the operation and maintenance team for alien plants at the within the power line servitude must occur and could be conducted simultaneously with erosion monitoring as per Eskom Standards.
- » When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels.
- » Clearing methods must aim to keep disturbance to a minimum.
- » No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.

Residual Impacts:
If the above recommended mitigation measures are strictly implemented and some re-establishment and rehabilitation of natural vegetation is allowed the residual impact will be very low.

Impact: Altered runoff and infiltration patterns due to rainfall interception by PV panel infrastructure and compacted areas resulting in high levels of erosion
Nature: Disturbance created during construction could take several years to fully stabilise and the presence of an extensive area of hardened surface will generate a lot of runoff which will pose a significant erosion risk, if not managed. Erosion is one of the greater risk factors associated with this type of development, and it is therefore essential that proper erosion control structures are built and maintained over the lifespan of the project.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Very short-term (1)
Magnitude	High (8)	Low (1)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (56)	Low (6)
Status (positive or negative)	Negative	Neutral – Slightly Negative
Reversibility	Low – if erosion has reached severe levels the impacts will not be remedied easily.	High
Irreplaceable loss of resources?	Potential loss of important resources.	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:
- » Regular monitoring of the site (minimum of twice annually) to identify possible areas of erosion is recommended, particularly after large summer thunder storms have been experienced.
- » The higher level of shading anticipated from PV panels may prevent or slow down the re-establishment of some desirable species, therefore re-establishment should be monitored and species composition adapted if vegetation fails to establish sufficiently.
- » Alternatively, soil surfaces where no revegetation seems possible will have to be covered with gravel or small rock fragments to increase porosity of the soil surface, slow down runoff and prevent wind- and water erosion.
- » Monitor the area below and around the panels regularly after larger rainfall events to determine where erosion may be initiated and then mitigate by modifying the soil micro-topography and revegetation efforts accordingly.
- » Due to the nature and larger runoff surfaces of the PV panels, the development area should be adequately landscaped and rehabilitated to contain expected accelerated erosion.
- » Runoff may have to be specifically channelled or storm water adequately controlled to prevent localised rill and gully erosion.
- » Any erosion problems observed should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- » Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring to assess the success of the remediation.

Residual Impacts:

The loss of fertile soil and soil capping resulting in areas which cannot fully rehabilitate itself with a good vegetation cover. With appropriate avoidance and mitigation residual impacts will be very low.

Assessments of impacts associated with the facility on-site substation and the Eskom switching station

- On-Site Substation Alternative 1: This substation option will be located within a secondary grassland that has been historically cultivated.
- On-Site Substation Alternative 2: This substation option will be located within a near-natural primary grassland.
- For both on-site substation alternatives, the impacts relating to terrestrial ecology are very similar and as such the impact assessment conducted below, relating to terrestrial ecology, is applicable to both alternatives.

Impact: Potential impacts on vegetation and listed or protected plant species
Nature: Vegetation clearing will lead to the loss of current habitat and is an inevitable consequence of this type of activity. The extent of the substation footprint, is however, small. Furthermore, no species of conservation concern were recorded within any of the proposed footprint areas.

The loss of local vegetation within the footprints are expected to be of relatively minor significance when considered on a broad scale.

Alternative 1 & 2 (including Facility substation and Eskom switching station)		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (3)	Small (2)
Probability	Definite (5)	Improbable (2)
Significance	Medium (40)	Low (14)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes to a large extent	

Mitigation:

- Pre-construction walk-through of the grid corridor to locate species of conservation concern that can be translocated or avoided.
- Vegetation clearing to commence only after walkthrough has been conducted and necessary permits obtained.
- Pre-construction environmental induction for all construction staff on-site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas, etc.
- Demarcate all areas to be cleared with construction tape or similar material where practical. However, caution should be exercised to avoid using material that might entangle fauna.
- Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
- All vehicles to remain within demarcated construction areas and no unnecessary driving in the veld outside these areas should be allowed.
- Existing tracks should be used for access wherever possible.
- No fires should be allowed on-site.

Residual Impacts:

Some residual vegetation loss will result from the development, equivalent to the operational footprint of the power line.

Impact: Direct faunal impacts
Nature: Disturbance, transformation, and loss of habitat will have a negative effect on resident fauna during construction.

There are fauna residents within the site, and these will be impacted during grid corridor. However, faunal diversity and density within the site are low, and post-mitigation impacts are likely to be Low and of Local significance only.

Increased levels of noise, pollution, disturbance, and human presence during the construction phase may affect the local fauna. Sensitive and shy fauna would move away from the area during the construction phase and may move back into the area upon completion of the construction phase. Some slow-moving species (i.e. tortoise and snakes) would not be able to avoid the activities and might be killed.

Faunal diversity and density within the site are low and post-mitigation impacts are likely to be Low and of Local significance only.

Alternative 1 & 2 (including Facility substation and Eskom switching station)		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Very Improbable (1)
Significance	Low (15)	Low (5)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate to High
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Noise and disturbance during the construction, decommission and during maintenance phases cannot be avoided but would be transient in nature and with appropriate mitigation; no long-term impacts from the construction phase can be expected.	

Mitigation:

- All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises which are often persecuted out of superstition.
- Site access should be controlled and no unauthorised persons should be allowed onto the site.
- Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site.
- Fires should not be allowed on site.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises.
- Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).

Residual Impacts:
There will be minimal residual impact as the facility will have low operational impacts on fauna, after the construction phase.

Impact: Soil erosion and associated degradation of ecosystems

Nature During construction/decommission, there will be a lot of disturbed and loose soil at the site which will render the area vulnerable to erosion. It is critically important that proper erosion control structures are built and maintained over the lifespan of the project.

Alternative 1 & 2 (including Facility substation and Eskom switching station)		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Short-term (1)
Magnitude	Minor (4)	Small (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (24)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- Any erosion problems observed to be associated with the access road and/or hardened/engineered surfaces should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- All bare areas due to the project activities should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable.
- An erosion control management plan should be utilised to prevent erosion
- There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.
- Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry
- Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.
- Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.

Residual Impacts:
The loss of fertile soil and soil capping resulting in areas which cannot fully rehabilitate itself with a good vegetation cover. With appropriate avoidance and mitigation residual impacts will be very low.

Impact: Alien plant invasion
Nature: The disturbed and bare ground that is likely to be present at the site during and after construction would leave the site vulnerable to alien plant invasion for some time if not managed. Furthermore, the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as well as the Conservation of Agricultural Resources Act, (Act No. 43 of 1983) requires that listed alien species are controlled in accordance with the Act.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Short-term (1)
Magnitude	Minor (4)	Small (1)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (40)	Low (6)
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- A site-specific eradication and management programme for alien invasive plants must be implemented during construction.

- » Regular monitoring by the operation and maintenance team for alien plants at the within the power line servitude must occur and could be conducted simultaneously with erosion monitoring.
- » When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels.
- » Clearing methods must aim to keep disturbance to a minimum.
- » No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.

Residual Impacts:
If the above recommended mitigation measures are strictly implemented and some re-establishment and rehabilitation of natural vegetation is allowed the residual impact will be very low.

Impact: Altered runoff and infiltration patterns due to rainfall interception by PV panel infrastructure and compacted areas resulting in high levels of erosion
Nature: The presence of an extensive area of hardened surface during operation will generate a lot of runoff which will pose a significant erosion risk, if not managed. Erosion is one of the greater risk factors associated with this type of development, and it is therefore essential that proper erosion control structures are built and maintained over the lifespan of the project.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	short-term (1)
Magnitude	Minor (2)	Small (1)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (32)	Low (9)
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- » Regular monitoring of the site (minimum of twice annually) to identify possible areas of erosion is recommended, particularly after large summer thunder storms have been experienced.
- » All bare areas due to the project activities should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable.
- » Alternatively, soil surfaces where no revegetation seems possible will have to be covered with gravel or small rock fragments to increase porosity of the soil surface, slow down runoff and prevent wind- and water erosion.
- » Monitor the area below and around the panels regularly after larger rainfall events to determine where erosion may be initiated and then mitigate by modifying the soil micro-topography and revegetation efforts accordingly.
- » Due to the nature and larger runoff surfaces, the development area should be adequately landscaped and rehabilitated to contain expected accelerated erosion.
- » Runoff may have to be specifically channelled or storm water adequately controlled to prevent localised rill and gully erosion.
- » Any erosion problems observed should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- » Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring to assess the success of the remediation.

Residual Impacts:
The loss of fertile soil and soil capping resulting in areas which cannot fully rehabilitate itself with a good vegetation cover. With appropriate avoidance and mitigation residual impacts will be very low.

Assessment of impacts associated with the gridline connection Alternatives 1 and 2

- Gridline connection Alternative 1 (refer to figure 7.1): This gridline corridor is the longer alternative (2.2km) and will traverse an addition portion of primary grassland as well as some secondary grassland (historically cultivated) to the east.
- Gridline connection Alternative 2: This gridline is relative short (991m) and will only traverse primary grassland;
- Due to the fact that gridline connection Alternative 2 will impact a larger area, it is envisaged that this alternative will have a somewhat more significant impact on the ecology of the area. However due to the linear nature (relative small impact area) and fact that a portion of the this option will traverse secondary grassland, the significance of impacts associated with this gridline option will only be slightly higher for certain aspects, while for other aspects the difference in significance be almost negligible.

Impact: *Potential impacts on vegetation and listed or protected plant species*
Impact Nature: Impacts on vegetation and listed or protected plant species would occur due to the construction of the facility and associated infrastructure. This impact is regarded as the most likely and significant impact and may lead to direct loss of vegetation including listed and protected species.

The most likely consequences include:
- local loss of habitat (to an extent as a natural ground covering will be maintained where possible);
- very small and local disturbance to processes maintaining local biodiversity and ecosystem goods and services;
- a potential loss of a few local protected species.

The development footprints for both alternatives are primarily homogenous in terms of habitat types and vegetation cover thus providing for easier and more accurate calculation of potential impacts, more effective recommendations and implementation of management and mitigation measures, and furthermore lowering the impact. The loss of local vegetation within the footprint is expected to be of relatively minor significance when considered on a broad scale.

	Grid Alternative 1		**Grid Alternative 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Minor (4)	Small (2)	Moderate (5)	Minor (3)
Probability	Definite (5)	Improbable (2)	Definite (5)	Improbable (2)
Significance	**Medium (45)**	**Small (14)**	**Medium (50)**	**Low (16)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	Moderate	Low	Moderate
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes, to a large extent			
Mitigation:	» Pre-construction walk-through of the power line route/corridor to locate species of conservation concern that can be translocated or avoided. » Vegetation clearing to commence only after walkthrough has been conducted and necessary permits obtained. » Pre-construction environmental induction for all construction staff on-site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas, etc. » Caution should be exercised to avoid using material that might entangle fauna. » Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.			

	» Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. » Ensure that, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible. » All vehicles to remain within demarcated construction areas and no unnecessary driving in the veld outside these areas should be allowed. » Existing tracks should be used for access wherever possible. » No fires should be allowed on-site.
Residual Impacts	» Some residual vegetation loss will result from the development, equivalent to the operational footprint of the power line.

Impact: *Direct faunal impacts*
Impact Nature: Disturbance, transformation, and loss of habitat will have a negative effect on resident fauna during construction.
There are fauna residents within the site, and these will be impacted during the construction of the power line. However, faunal diversity and density within the site are low, and post-mitigation impacts are likely to be Low and of Local significance only.
Increased levels of noise, pollution, disturbance, and human presence during the construction phase may affect the local fauna. Sensitive and shy fauna would move away from the area during the construction phase and may move back into the area upon completion of the construction phase. Some slow-moving species (i.e. tortoise and snakes) would not be able to avoid the activities and might be killed.

Faunal diversity and density within the site are low and post-mitigation impacts are likely to be Low and of Local significance only.

	Gridline Alternative 1		**Gridline Alternative 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Minor (2)	Low (4)	Minor (2)
Probability	Probable (3)	Very Improbable (1)	Probable (3)	Very Improbable (1)
Significance	**Low (21)**	**Low (5)**	**Low (21)**	**Low (5)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	Moderate	Low	Moderate
Irreplaceable loss of resources	Unlikely	Unlikely	Unlikely	Unlikely
Can impacts be mitigated?	Yes, to a large extent			
Mitigation:	» All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises which are often persecuted out of superstition. » Site access should be controlled and no unauthorised persons should be allowed onto the site. » Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. » Fires should not be allowed on site. » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.			

	» All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises. » Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).
Residual Impacts	» There will be minimal residual impact as the facility will have **low** operational impacts on fauna, after the construction phase.

Impact : *Soil erosion and associated degradation of ecosystem*
Nature: During construction/decommission, there will be a lot of disturbed and loose soil at the site which will render the area vulnerable to erosion. It is critically important that proper erosion control structures are built and maintained over the lifespan of the project.

	Gridline Alternative 1		**Gridline Alternative 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Medium-term (3)	Short-term (1)	Medium-term (3)	Short-term (1)
Magnitude	Low (4)	Minor (2)	Low (5)	Minor (2)
Probability	Probable (3)	Improbable (2)	Probable (3)	Improbable (2)
Significance	**Low (24)**	**Low (8)**	**Low (27)**	**Low (8)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	High	Low	High
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes, to a large extent			
Mitigation:	» Any erosion problems observed to be associated with the access road and/or hardened/engineered surfaces should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. » All bare areas due to the project activities should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. » An erosion control management plan should be utilised to prevent erosion. » There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. » Construction of gabions and other stabilisation features to prevent erosion, if deemed necessary. » Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry. » Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation. » Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas.			
Residual Impacts	» The loss of fertile soil and soil capping resulting in areas which cannot fully rehabilitate itself with a good vegetation cover. With appropriate avoidance and mitigation residual impacts will be **very low**.			

Impact : Alien Plant Invasion
Nature: The disturbed and bare ground that is likely to be present at the site during and after construction would leave the site vulnerable to alien plant invasion for some time if not managed. Furthermore, the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as well as the Conservation of Agricultural Resources Act, (Act No. 43 of 1983) requires that listed alien species are controlled in accordance with the Act.

	Gridline Alternative 1	**Gridline Alternative 2**

	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Permanent (5)	Short-term (1)	Permanent (5)	Short-term (1)
Magnitude	Low (4)	Small (1)	Low (5)	Small (1)
Probability	Highly Probable (4)	Improbable (2)	Highly Probable (4)	Improbable (2)
Significance	**Medium (40)**	**Low (6)**	**Medium (44)**	**Low (6)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	High	Low	High
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes, to a large extent			
Mitigation:	» A site-specific eradication and management programme for alien invasive plants must be implemented during construction. » Regular monitoring by the operation and maintenance team for alien plants at the within the power line servitude must occur and could be conducted simultaneously with erosion monitoring. » When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. » Clearing methods must aim to keep disturbance to a minimum. » No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.			
Residual Impacts	» If the above recommended mitigation measures are strictly implemented and some re-establishment and rehabilitation of natural vegetation is allowed the residual impact will be **very low**.			

7.2.4 Comparative Assessment of Alternatives

Grid connection Alternative 1 will impact on a larger area as such impacts associated with this option will be slightly higher in significance. However, due to the nature of such linear developments and that fact that both options will not impact any sensitive habitats the significance of impacts associated with grid option 1 will only be slightly higher for certain aspects, while for other aspects the difference in significance be almost negligible.

Aspect: Ecology		
Grid connection (including substations and connection line)	**Alternative 1** (technically preferred) » Acceptable (less preferred)	**Alternative 2** » Acceptable
Preferred alternatives from an ecology perspective	Both considered acceptable	

7.2.5 Implications for Project Implementation

From the outcomes of the studies undertaken, it is concluded that

- » No high sensitive features and "No-Go" areas were identified;
- » the bulk of the project site located within a Low to Medium sensitive area while the remainder of the project has been classified as medium sensitivity, and

» no significant terrestrial ecological flaws, that could pose a problem to the proposed PV Facility development, were identified during the EIA phase assessment.

Based on the above, from an ecological perspective there are no objections to the development and as such the project may be approved by the competent authority.

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of ecological impacts of Dicoma PV can be reduced to low. The following mitigation measures were been recommended:

» A Pre-Construction Faunal/Floral Walk-Through survey will have to be conducted in order to identify any sensitive species (protected and SCC) that may occupy/inhabit the development footprints of the PV Facility and to assist in the biodiversity permitting processes.
» Disturbed vegetation in the study area carries a high risk of invasion by alien invasive plants, which may or may not be present in the study area or nearby. The control and continuous monitoring and eradication of alien invasive plants will form and integral part of the environmental management of the facility from construction up to decommissioning.
» A site-specific eradication and management programme for alien invasive plants must be implemented during construction.
» Any erosion problems observed to be associated with the access road and/or hardened/engineered surfaces should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
» An erosion control management plan should be utilised to prevent erosion.

7.3. Potential Impacts on Avifauna

The significance of the impacts on avifauna expected with the development of the Dicoma PV project has been assessed as medium to low, depending on the impact being considered, with the implementation of mitigation measures. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details).

7.3.1 Results of the Avifauna Impact Assessment

Habitat units comprising potential avifauna sensitive elements have been identified within the project site. These sensitive elements have been classified as being of a medium sensitivity and are described below.

» Areas of medium sensitivity

The medium sensitivity habitat units includes the extensive open grassland and bush clump mosaics.

The extensive open grassland and bush clump mosaics provide potential suitable foraging habitat for some collision-prone bird species, including the Northern Black Korhaan (*Afrotis afraoides*) with the potential to interact (e.g. collide) with the proposed electrical infrastructure. However, reporting rates for threatened and near threatened bird species were relatively low, thereby suggesting a medium sensitivity rating instead of a high sensitivity even though the majority of the habitat is natural. In addition, the open grassland and bush clump mosaics are widespread in the region. These habitat units are widespread in the broader study region, therefore the displacement of birds at these habitat units is not regarded as a fatal flaw nor are any of these units considered to be no-go areas. **Figure 7.3** illustrates the avifaunal sensitivity of the site based on the ecological condition of habitat types and the occurrence of collision prone species.

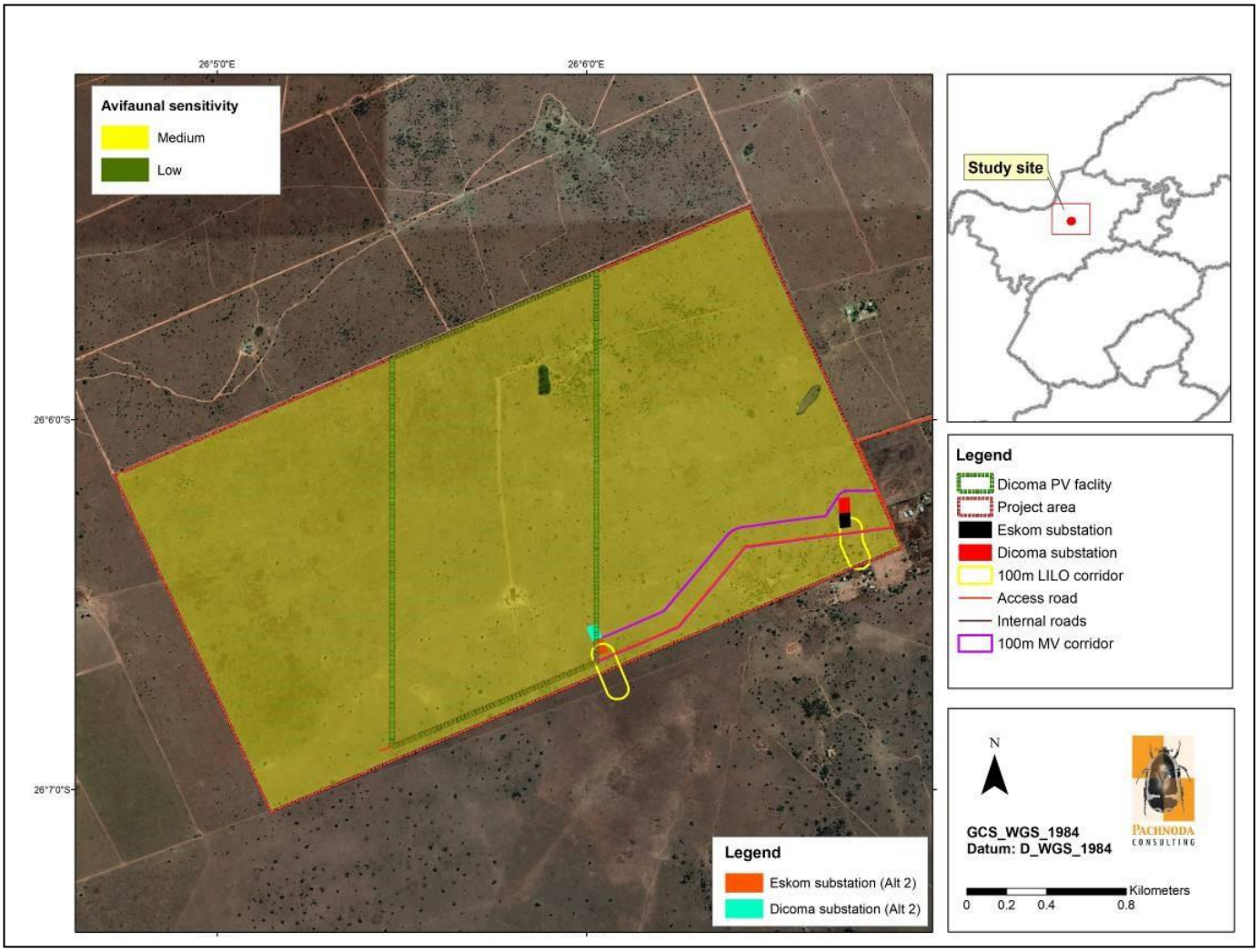


Figure 7.3: Avifaunal sensitivity map for the Dicoma PV site, including the powerline corridor alternatives.

7.3.2 Description of Avifaunal Impacts

Negative avifauna impacts expected to occur with the development of Dicoma PV includes a loss of habitat and displacement of birds, the creation of "new" avian habitat and bird pollution, collision trauma caused by PV panels and interaction with the power line.

» ***Loss of habitat and displacement of birds***

Approximately 180 ha of the site will be cleared of vegetation and habitat to accommodate the panel arrays and associated infrastructure. Clearing of vegetation will inevitably result in the loss of habitat and displacement of bird species. From the results, approximately 3.37 species.ha^{-1} and 4.57 birds.ha^{-1} will become displaced should the activity occur across all the habitat types on the study site (as per Jenkins et al., 2017). Displacement will mainly affect passerine and smaller non-passerine species inhabiting the untransformed dolomite grasslands and bush clump mosaics.

The following bird species are most likely to be impacted by the loss of habitat due to their habitat requirements, endemism and conservation status (although not limited to) due to the proposed development:

» Northern Black Korhaan (*Afrotis afraoides*);
» Melodious Lark (*Mirafra cheniana*);
» Kalahari Scrub Robin (*Cercotrichas paena*);
» Orange River Francolin (*Scleroptila gutturalis*); and
» potentially also small to medium birds of prey such as: Black-winged Kite (*Elanus caeruleus*) Rock Kestrel (*Falco rupicolus*) and Black-chested Snake-eagle (*Circaetus pectoralis*).

When considering the number of displaced bird species and their widespread occurrence in the region, the predicted impact due to the overall displacement and habitat loss is moderate without mitigation measures.

Two internal substation and LILO corridor alternatives are proposed (Alternative 1 and Alternative 2). It is unlikely that the significance of the impact will differ significantly between the two alternatives. Both alternatives include the same habitat types. In addition, the substation footprints are a small surface area (1ha each), which will result in a reduced impact significance rating (when compared to the PV layout).

» ***Creation of "new" avian habitat and bird pollution***
It is possible that the infrastructure (during operation) could attract bird species which may occupy the site or interact with the local bird assemblages in the wider region. These include alien and cosmopolitan species, as well as aggressive omnivorous passerines which could displace other bird species from the area:

» House Sparrow (*Passer domesticus*);
» Common Myna (*Acridotheres tristis);*
» Pied Crow (*Corvus albus)*; and
» Speckled Pigeon (*Columba guinea*).

The infrastructure may attract large numbers of roosting columbid taxa, especially Speckled Pigeons (Columba guinea), which may result in avian "pollution" through excreta, thereby fouling the panel surfaces. The impact is manageable and will result in a low significance.

» ***Collision trauma caused by PV panels (the " lake-effect")***
The study site is not located in close proximity to any major wetland system or water body. The nearest wetland system is approximately 4km east of the site, and the nearest large wetland system that is inundated is approximately 6 km from the study site, which explain the low occurrence of waterbird taxa at the study site. These wetland habitat types are often utilised by waterbirds which could accidentally mistake the reflective panels for waterbodies, thereby resulting in bird collisions with the panel surfaces. At this stage the impact is considered to be low although it is uncertain what the significance of it will be during the peak summer season depending on subsequent site visits (e.g. pre-construction monitoring) during the peak wet season when most of the wetland features in the region are inundated. This makes predictions regarding the occurrence of waterbird species and their numbers (e.g. density) in the area inconceivable.

However, desktop results and site observations show that the following species could interact with the panel infrastructure:
» Yellow-billed Duck (*Anas undulata)*
» Red-billed Teal (*Anas erythrorhynchus*);

- South African Shelduck (*Tadorna cana*);
- Spur-winged Goose (*Plectropterus gambiensis*);
- Egyptian Goose (*Alopochen aegyptiaca*);
- Black-headed Heron (*Ardea melanocephala*);
- Grey Heron (*Ardea cinerea*) and
- White-faced Duck (*Dendrocygna viduata*).

Of these species, the Spur-winged Goose and Black -headed Heron were confirmed on the study site and the immediate surroundings.

In the absence of sufficient information on the occurrence of waterbird taxa in the area, as well as the lack of data on bird mortalities caused by collisions, the precautionary principle was applied which results in an impact of moderate significance (in the absence of any mitigation measures).

- ***Interaction with overhead power lines***

A number of overhead power lines are proposed. These include the short loop-in loop out corridor alternatives at the internal substation (LILO Alternative 1 and LILO Alternative 2) which feeds directly into the existing power line network and two MV corridor alternatives which connect the PV arrays with the proposed substations. Birds are impacted in three ways by means of overhead power lines. It is however a common rule that large and heavy-bodied terrestrial bird species are more at risk of being affected in a negative way when interacting with power lines. These include the following:

- **Electrocution**

Electrocution happens when a bird bridges the gap between the live components or a combination of a live and earth component of a power line, thereby creating a short circuit. This happens when a bird, mainly a species with a fairly large wingspan attempts to perch on a tower or attempts to fly-off a tower. Many of these species include vultures (of the genera *Gyps* and *Torgos*) as well as other large birds of prey such as the Martial Eagle (*Polemaetus bellicosus*) (Ledger & Annegarn, 1981; Kruger, 1999; Van Rooyen, 2000). These species will attempt to roost and even breed on the tower structures if available nesting platforms are a scarce commodity in the area. Other types of electrocutions happen by means of so-called "bird-streamers". This happens when a bird, especially when taking off, excretes and thereby causes a short-circuit through the fluidity excreta (Van Rooyen & Taylor, 1999).

Large transmission lines (from 220kV to 765kV) are seldom a risk of electrocution, although smaller distribution lines (88kV – 132kV) pose a higher risk. However, for this project, the design of the pylon is an important consideration in preventing bird electrocutions. However, electrocution is proportional to the spatial position of carcasses, and will probably only occur when a carcass is located underneath or in close proximity to an overhead distribution power line.

- **Collision**

Collisions with earth wires have probably accounted for most bird-power line interactions in South Africa. In general, the earth wires are much thinner in diameter when compared to the live components, and therefore less visible to approaching birds. Many of the species likely to be affected include heavy, large-bodied terrestrial species such as bustards, korhaans and a variety of waterbirds that are not very agile or manoeuvrable once airborne. These species, especially those with the habit of flying with outstretched necks (e.g. most species of storks) find it difficult to make a sudden change in direction while flying – resulting in the bird flying into the earth wires.

Areas where bird collisions are likely to be high could be ameliorated by marking the lines with appropriate bird deterrent devices such as "bird diverters" and "flappers" to increase the visibility of the lines. In addition, the overall length of the Grid alternative 2 is shorter when compared to the Grid alternative 1 , while most of the alignment of the Grid alternative 2 is located alongside existing power lines, thereby reducing the impact of potential avian collisions significantly. It may be argued that the placement of the proposed corridor along an existing power line will greatly increase the visibility of the overhead cables to passing birds (during daylight), thereby reducing avian collision with the overhead cabling structures. Therefore, the impact of avian collisions at Grid alternative 2 is predicted to be lower when compared to alternative 1.

This may be true for most other bird species that are prone towards power line collision, although the risk of Cape Vultures and White-backed Vultures colliding with the power line will persist due to the foraging behaviour and ecological requirements of this species. Cape Vultures feed communally and congregate in large numbers at a carcass; therefore any power line in close proximity could result in this species colliding with the earth wires, often resulting in more than a single mortality.

» **Physical disturbances and habitat destruction caused during construction and maintenance**
It is anticipated that access roads need to be constructed, including the clearing of vegetation as part of the power line servitude. In addition, construction activities go hand in hand with high ambient noise levels. Although construction is considered temporary, many species will vacate the area during the construction phase and will become temporarily displaced.

7.3.3 Impact tables summarising the significance of impacts on avifauna related to the PV facility and associated infrastructure including the LILO corridor (the grid alternatives are similar and there is no comparative assessments and the substations have been assessed as an area) during construction and operation (with and without mitigation)

Nature: Loss of habitat Loss of natural habitat and displacement of birds through physical transformation, modifications, removals and land clearance. This impact is mainly restricted to the construction phase and is permanent.		
	Development site (PV Layout and associated infrastructure)	
	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Permanent(5)	Permanent(5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Probable (3)
Significance	Medium (65)	Medium (39)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, to some extent	
	Substation (Alternative 1 and Alternative 2)	
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Probable (3)
Significance	Medium (50)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low

Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, to some extent	
Mitigation: It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. It is unlikely that the significance of the impact will change should the facility be constructed on any of the alternative options. Both the PV facility and substation/s contain the same habitat types of medium sensitivity. The best practicable mitigation will be to consolidate infrastructure to areas where existing impacts occur). The proposed substation covers a small surface area, which will result in a reduced impact significance rating.		
Residual Impacts: It is anticipated that during rehabilitation (after the removal of the panels) that the vegetation will revert to secondary grassland resulting in a decreased bird species richness with low evenness values on a local scale. The residual impact of the PV facility will be medium. The residual impact of the substation will be low due to the small surface are of habitat loss.		

Nature: Creation of "new" avian habitat The creation of novel or new avian habitat for commensal bird species or superior competitive species. This is expected to occur during the operation phase of the facility.		
	Development site (PV Layout and associated infrastructure)	
	Without mitigation	With mitigation
Extent	Footprint (1)	Footprint (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Low (18)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, with experimentation	
Mitigation: » Apply bird deterrent devices within the facility and remove nest structures constructed on infrastructure associated with the PV facility under the guidance of the CEO.		
Residual Impacts: Secondary displacement by completive bird species such as crows and increased fecundity rate for commensal bird species that are adapted to anthropogenic activities. The impact is regarded as low.		

Nature: Avian collision with PV panels Avian collision impacts related to the PV facility during the operation phase (i.e. collision with PV panels)		
	Development site (PV Layout and associated infrastructure)	
	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	Medium (30)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No, although threatened species are present in the area, these are likely to become displaced; waterbirds are uncommon due to the absence of prominent water/wetland features in the area.	No

Can impacts be mitigated?	Yes, to some extent
Mitigation: » Apply bird deterrent devices to the panels for birds that may mistake the panels for open water and to prevent them from landing on the panels. If the pre-construction and post-construction monitoring predicts and/or confirms any bird mortalities, an option is to employ video cameras at selected areas to document bird mortalities and to conduct direct observations and carcass searches on a regular and systematic basis.	
Residual Impacts: Direct mortality is possible and may still occur irrespective of applied mitigation measures. Regular and systematic monitoring is proposed to assess the efficacy of applied mitigation and further research and testing is suggested to improve mitigation measures (e.g. bird deterrent devices). The residual impact is regarded as low.	

Nature: Avian collision with power line Avian collision impacts related to the overhead power lines during the operation phase.		
	Alternative 1 & 2 (LILO Corridor)	
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes, owing to the potential loss of critically endangered or endangered bird species	Yes
Can impacts be mitigated?	Yes	
Mitigation: » Apply bird deterrent devices to the power line and make use of "bird-friendly" pylon structures. » Avoid the placement of cattle feedlots, kraals and watering points in close proximity to overhead electrical infrastructure » To aid post-construction monitoring and/or monitoring of bird mortality rates, it is advised to conduct direct observations and carcass searches on a regular and systematic basis. » As a priority, all new power lines should be marked with bird diverters » In addition, the impact significance (after mitigation) will be reduced if the proposed corridor is placed alongside an existing power line servitude.		
Residual Impacts: Direct mortality is possible and may still happen irrespective of applied mitigation measures. The residual impact will be medium.		

Nature: Avian electrocution impacts due to power line Avian electrocution related to the new distribution lines during operation.		
	All proposed corridors	
	Without mitigation	With mitigation
Extent	Regional (4)	Immediate area (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Probable (3)
Significance	High (48)	Medium (45)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low

Irreplaceable loss of resources?	Yes, owing to the potential loss of critically endangered or endangered bird species	Yes, impact could still occur irrespective of mitigation.
Can impacts be mitigated?	Yes, to some extent	
Mitigation: » Electrocution is proportional to the spatial position of carcasses (with reference to scavenging birds of prey), and will probably only occur when a carcass is located underneath or in close proximity to an overhead distribution power line. » Apply bird deterrent devices to the power line. Avoid the placement of cattle feedlots and watering points near electrical infrastructure. All cattle feedlots within close proximity of powerlines (~100m) should preferably be relocated (>100m from powerlines). » Grazing of cattle at or in close proximity to distribution lines should be monitored at all times and preferably be avoided (to minimise potential livestock carcasses near distribution lines). » Make use of bird-friendly pylons and bird guards as recommended by EWT. Position electrical infrastructure in close proximity to existing infrastructure.		
Residual: Direct mortality is possible and may still happen irrespective of applied mitigation measures. The residual impact will be medium.		

7.3.4 Comparative Assessment of Alternatives

Grid connection alternatives

There is no preferred grid connection corridor alternative from an avifauna perspective and both alternatives as assessed in the EIA are considered to be acceptable.

Aspect: Avifauna		
Grid connection	**Alternative 1** (technically preferred)	**Alternative 2**
	» Acceptable	» Acceptable
Preferred alternatives from an avifauna perspective	Grid connection – Both considered acceptable	

7.3.5 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of avifauna impacts associated with Dicoma PV will be medium to low. Areas of low to medium sensitivity have been identified within the project site.

From the outcomes of the studies undertaken, it is concluded that the PV facility and associated infrastructure can be developed and impacts on avifauna managed by taking the following into consideration:

» Concentrate all surface infrastructure on habitat of medium to low avifaunal sensitivity. The development footprint of the various individual facilities must be kept as small as possible and sensitive habitats must be avoided. Where possible, artificial livestock watering points should be relocated and should be located at least 100m away from powerline servitudes.
» Where possible, existing access roads should be used and the construction of new roads should be kept to a minimum.
» Use indigenous plant species native to the study area during landscaping and rehabilitation.

- All internal electrical reticulation should be placed underground, while the alignment of the power line should be placed parallel to existing lines.
- Reduce or minimise the use of outdoor lighting to avoid attracting birds to the lights or to reduce potential disorientation to migrating birds.
- At least one additional pre-construction survey is recommended, consisting of a minimum of 1-2 days (during the peak wet season).
- A post-construction surveys during operation with a minimum of 2x 3 day surveys during a six month period (including the peak wet season) is recommended.

7.4. Assessment of Impacts on Land Use, Soil and Agricultural Potential

The impact of Dicoma PV on the soils, land use, land capability and agricultural potential has been assessed as low to medium (after mitigation), depending on the impact being considered. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** – Soils Impact Assessment for more details).

7.4.1 Results of the Land Use, Soil and Agricultural Potential Study

Soil properties
The soil profiles classified within the project site consist of the Glenrosa, Mispah and Nkonkoni forms as described below and illustrated.

Glenrosa soils

Glenrosa is the dominant soil form within the development area as well as the Grid Connection Corridor Alternative 1. The total area of Glenrosa soils identified within these areas, is 179.3ha. The Glenrosa soils range in depth between 0.05 and 0.30m and consist of orthic topsoil horizons that are either bleached or chromic (light red in colour) with lithic material underneath (refer to **Figure 7.4**). The lithic horizon of the Glenrosa soils within the Dicoma PV development 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 7.4: Photographic example of the Glenrosa soils

Mispah soils

The Mispah soils are present at 29.1ha of the Dicoma PV development area as well the grid connection corridor Alternative 2. The Mispah soils have similar shallow soil depth as the Glenrosa soils (0.05 to 0.30m) but differ in regards to the nature of the underlying material. The effective soil depth of the Mispah soils is restricted by solid and fractured rock. In some areas, the solid rock is visible on the surface as rock outcrops (as shown in figure 7.5 below).

Figure 7.5: Solid rock visible on surface of Mispah soils

Nkonkoni soils

Two isolated pockets of the Nkonkoni soil form is present within the Dicoma PV development area. There are no Nkonkoni soils within the grid connection corridor alternatives. The Nkonkoni soils consist of chromic (red) topsoil with sandy-loam texture that overlies a red apedal horizon. The red apedal horizon is limited in soil depth by the presence of lithic material. Differentiation was made in the soil map (refer to Figure 7.6) between the effective soil depths of the two areas of Nkonkoni soils. The Nkonkoni soils present directly east of the western boundary of the development area, is 0.5m deep for an area of 0.8ha and 0.9m deep for an area of 0.9ha. The deeper Nkonkoni soils will be able to retain more water after a rainfall event that will be able to grass roots for uptake.

Figure 7.6: Nkonkoni soils within the Dicoma PV development area that are 0.5m deep (A) and 0.9m deep (B)

Land capability

The largest part of the Dicoma PV development area as well as the grid connection alternatives, consist of land with Low-Moderate (Class 07) land capability. This land capability class is present along almost the entire eastern boundary of the development area while the southern section of the western boundary consists of land with Moderate-High (Class 09) land capability. A small section in the north western corner of the site as well as a small section on the western side of the Grid alternative 2 , also consist of Moderate-High (Class 09) land capability. The north eastern corner has lower land capability than the surrounding areas and is classified as Low-Moderate (Class 06). Very small sections of land Moderate (Class 08) land capability are present between land with Moderate-High (Class 09) and Moderate-Low (Class 07) land capability as well as within the Grid alternative 1 .

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 and grid connection alternatives was determined.

The largest part of the total area assessed, has Low agricultural potential (208.4ha). Low agricultural potential has been assigned to soils of the Mispah and Glenrosa forms as a result of the shallow soil depth that limits root growth and water storage capacity within these profiles. The areas with the deeper Nkonkoni profiles, have Low-Moderate agricultural potential. Although the profiles are deeper and are more suitable for crop production, the total areas of these two pockets of Nkonkoni soils are each smaller than 1ha and not considered viable areas for commercial grain production. The area is considered better suited to extensive livestock production, which is also the current land use on site.

The low agricultural potential of the soils within the development area and grid connection is confirmed by the absence of crop field boundaries within the Dicoma PV development area. The nearest crop fields with rainfed annual crops and planted pastures as well as centre pivot irrigation, are present directly west of the Dicoma site. More pivot irrigation is present about 8km north and 4km north-east of the site.

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 PV development area of 179ha can provide forage to 22 head of cattle. The grazing capacity is moderate to moderate-high in comparison to the grazing capacity of the rest of the country. The vegetation consists of a mixture of grasses as well as *Vachelia* and *Searsia* species. The grass cover shows signs of regular grazing and is sparse over large areas as a result of the shallow, rocky soils present.

Sensitivity analysis

Following the consideration of all the desktop and gathered baseline data above, the findings of the specialist report differ with the results of the DFFE Environmental Screening Tool. The soil forms present within the project area as well as in both alternative grid connection corridors, are mainly shallow soils that range in depth between 0.05 and 0.30m. Only two small areas of 0.8ha and 0.7ha area have deeper soils of the Nkonkoni form. Rock outcrops are present on the surface in several areas within the proposed Dicoma PV development area. The area has not historically been used for crop production and also not recently, 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 area is currently used for livestock farming and the proposed Dicoma PV development area can support 22 head of cattle at the long-term grazing capacity of 8ha/LSU (DALRRD, 2018). Considering the soil properties, land capability and agricultural potential of the development area, the entire area has **Low Agricultural Sensitivity** (refer to Figure 7.7). Soil in the project area will have Low to Medium sensitivity, depending on the successful implementation of mitigation measures to prevent soil erosion, compaction and pollution.

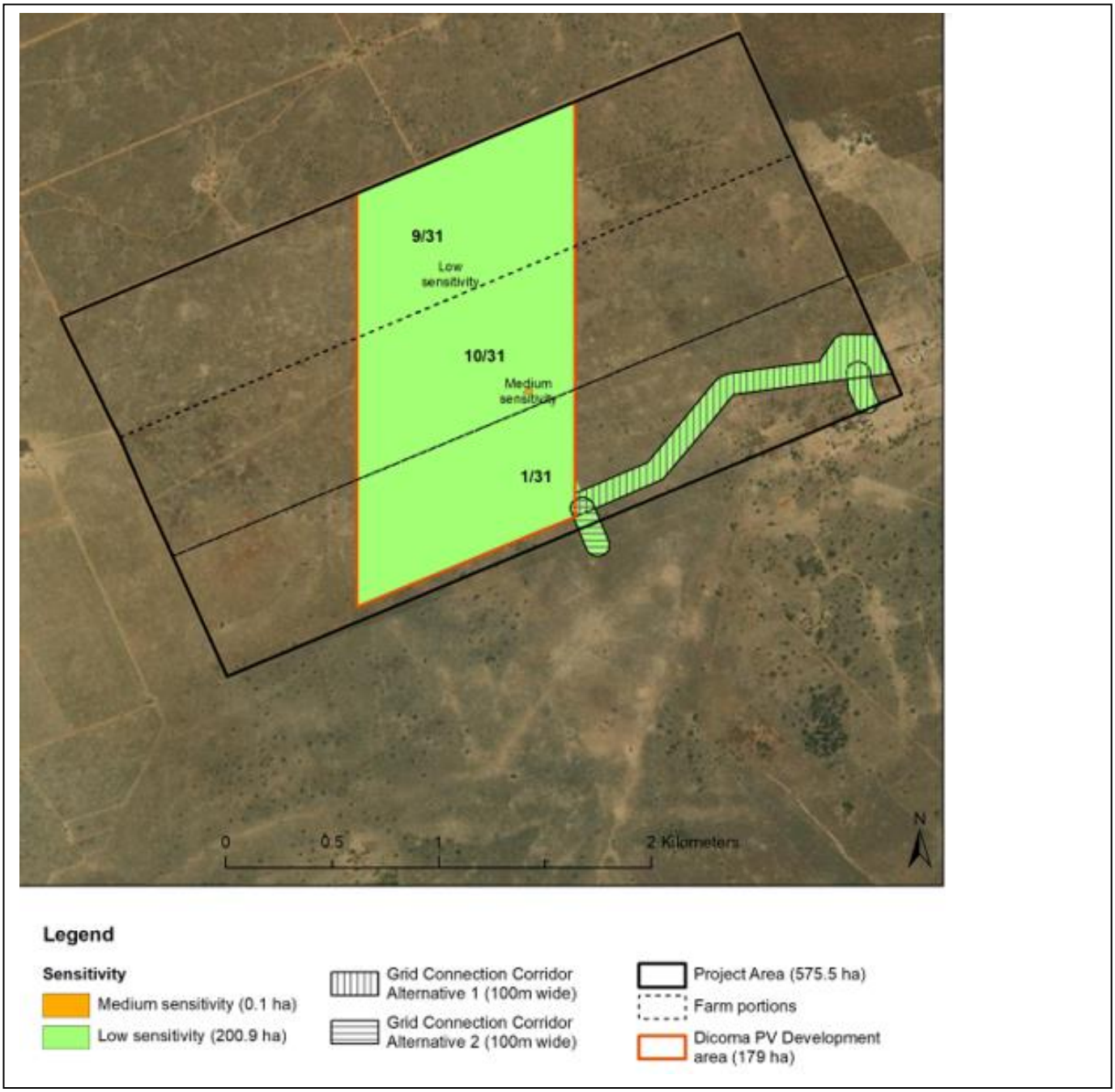


Figure 7.7: Agricultural sensitivity rating of the proposed Dicoma PV facility development and grid connection alternatives.

7.4.2 Description of Land Use, Soil and Agricultural Potential 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 erection 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.

7.4.3 Impact tables summarising the significance of impacts on Land Use, Soil and Agricultural Potential during construction and operation (with and without mitigation)

Construction phase

Impact: Change in land use from livestock farming to energy generation
Nature: Prior to construction of the project infrastructure, the area will be fenced off and livestock farming will be excluded from 179ha of land as well as where the grid connection will be. 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-term (3)	Medium-term (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	

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:
The residual impact from the construction of the Dicoma PV facility and associated infrastructure is considered medium.

Impact: Soil Compaction
Nature: 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	

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:
The residual impact from the construction and operation of the project on soil compaction is considered low.

Impact: 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.

Nature: The following construction activities can result in the chemical pollution of the soil:

- » Petroleum hydrocarbon (present in oil and diesel) spills by machinery and vehicles during earthworks and the removal of vegetation as part of site preparation;
- » Spills from vehicles transporting workers, equipment, and construction material to and from the construction site;
- » The accidental spills from temporary chemical toilets used by construction workers;
- » The generation of domestic waste by construction workers;
- » Spills from fuel storage tanks during construction;
- » Pollution from concrete mixing;
- » Pollution from road-building materials; and
- » 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	

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:
The residual impact from the construction and operation of the project on soil compaction is considered low.

Operations phase

Impact: Soil Erosion
During the operations phase, staff and maintenance personnel will access the project area daily.

Nature: 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	
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: The residual impact from the operation of the project on the susceptibility to erosion is considered low.		

Impact: Soil Pollution *Nature:* During the operations 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	
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: The residual impact from the operation of the proposed project will be low to negligible.		

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.

7.4.4 Comparative Assessment of Alternatives

Grid connection alternatives

There is no preferred grid connection alternative from a soil/agricultural perspective and both are considered to be acceptable.

Aspect: Soils/Agriculture		
Grid connection	**Alternative 1** (technically preferred)	**Alternative 2**
	» Acceptable (less preferred)	» Acceptable
Preferred alternatives from a soils/agricultural perspective	Grid connection – Both considered acceptable	

7.4.5 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of Dicoma PV is expected to have a Medium and Low impact on soils and agricultural potential, depending on which impact is being considered. These impacts can be reduced by keeping the footprints minimised where possible and strictly following soil management measures pertaining to erosion control and management and monitoring of any possible soil pollution sources such as vehicles traversing over the sites. From the outcomes of the studies undertaken, it is concluded that the PV facility can be developed and impacts on soils managed by taking the following into consideration:

- Limit vegetation clearance to only the areas where the surface infrastructure will be constructed
- Avoid parking of vehicles and equipment outside of designated parking areas.
- Plan vegetation clearance activities for dry seasons (late autumn, winter and early spring).
- Design and implement a Stormwater Management System where run-off from surfaced areas is expected.
- Re-establish vegetation along the access road to reduce the impact of run-off from the road surface.
- Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills.
- Any waste generated during construction must be stored in designated containers and removed from the site by the construction teams.
- Any left-over construction materials must be removed from site.
- Ensure battery transport and installation by accredited staff / contractors.
- Compile (and adhere to) a procedure for the safe handling of battery cells during transport and installation.

7.5. Assessment of Impacts on Heritage Resources

Negative impacts on heritage resources will be due to loss of archaeological and palaeontological resources during construction activities of Dicoma PV. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G**).

7.5.1 Results of the Heritage Impact Assessment (including archaeology and palaeontology)

Stone Age Archaeology

Field assessment 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.

Stone Structures

The structures with spatial layouts of potential graves are ranked in terms of sensitivity below in **Table 7.1.** None have headstones or inscriptions, however due to their layout and orientation, it is likely that these structures represent burials. The other structures are less typical for human graves and have a range of sizes and orientations. These structures were recorded due to their proximity to abandoned building remains and other human made structures, and are considered to be potentially sensitive due to their spatial association to historical human occupation and activity, rather than their morphology and orientation. In terms of material form, the latter cannot definitively be identified as graves.

Table 7.1: Heritage resources identified within the Dicoma PV development area

Site No.	Site Name	PV Area	Description	Co-ordinates		Grading	Mitigation
LCTB 002	LIC HOUSE	Dicoma	Historic house	26,099023	-26,098134	IIIC	None required
LCTB 003	LIC BUR?1	Dicoma	Stone structure - likely burial. Occur within an existing Farm Road	26,096115	-26,098202	IIIA	10m no-development buffer
LCTB 004	LICBUR2	Dicoma	Stone structure - likely burial. Occur within an existing Farm Road	26,09602	-26,100536	IIIA	10m no-development buffer
LCTB 005	LI 5	Dicoma	Flake with cortical platform and bi-directional core	26,095902	-26,102629	IIIC	None required
LCTB 006	LIC5	Dicoma	Bifacial point	26,093677	-26,103923	IIIC	None required
LCTB 007	LI CHERT3	Dicoma	Chert raw material source	26,09389	-26,104075	NCW	None required
LCTB 010	LIC9	Dicoma	Sparse stone artefact scatter	26,096485	-26,106449	IIIC	None required
LCTB 011	LIC10	Dicoma	Platform rejuvenation flake	26,096685	-26,108293	IIIC	None required

LCTB 012	LIC11	Dicoma	Sparse stone artefact scatter	26,096994	-26,11293	IIIC	None required
LCTB 014	LIC12	Dicoma	Sparse stone artefact scatter	26,097733	-26,112259	IIIC	None required
LCTB 019	LI 3	Dicoma	MSA and LSA retouched flakes	26,095999	-26,098162	IIIC	None required
LCTB 020	LI4	Dicoma	Hammerstone	26,096096	-26,09936	IIIC	None required
LCTB 021	LI8	Dicoma	MSA and LSA notched flakes, artefacts with evidence of post-depositional disturbance and Cores with ephemeral removals	26,092861	-26,10562	IIIC	None required
LCTB 022	**LI9**	Dicoma	**Stone structure - likely burial**	**26,091343**	**-26,106886**	IIIC	None required
LCTB 023	LIC8	Dicoma	Sparse stone artefact scatter	26,096008	-26,095638	IIIC	None required
LCTB 024	WADAP	Dicoma	Sparse stone artefact scatter	26,096995	-26,112918	IIIC	None required
LCTB 025	LI10	Dicoma	Chert raw material source	26,094757	-26,11079	NCW	None required

Palaeontology

The palaeontological sensitivity of the area under consideration is presented in **Figure 7.8**, with the Monte Christo and Oaktree Formations of the Malmani Subgroup indicated as very highly sensitive (red) because of the potential of finding trace fossils, in particular stromatolites.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to contain trace fossils, namely stromatolites in the Malmani Subgroup. However, the material to be excavated is loose sand and it has been confirmed that this does not preserve fossils. Since there is an extremely small chance that trace fossils, stromatolites, from the Malmani Subgroup may occur below ground and may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low. No palaeontological resources of significance were identified within the development area.

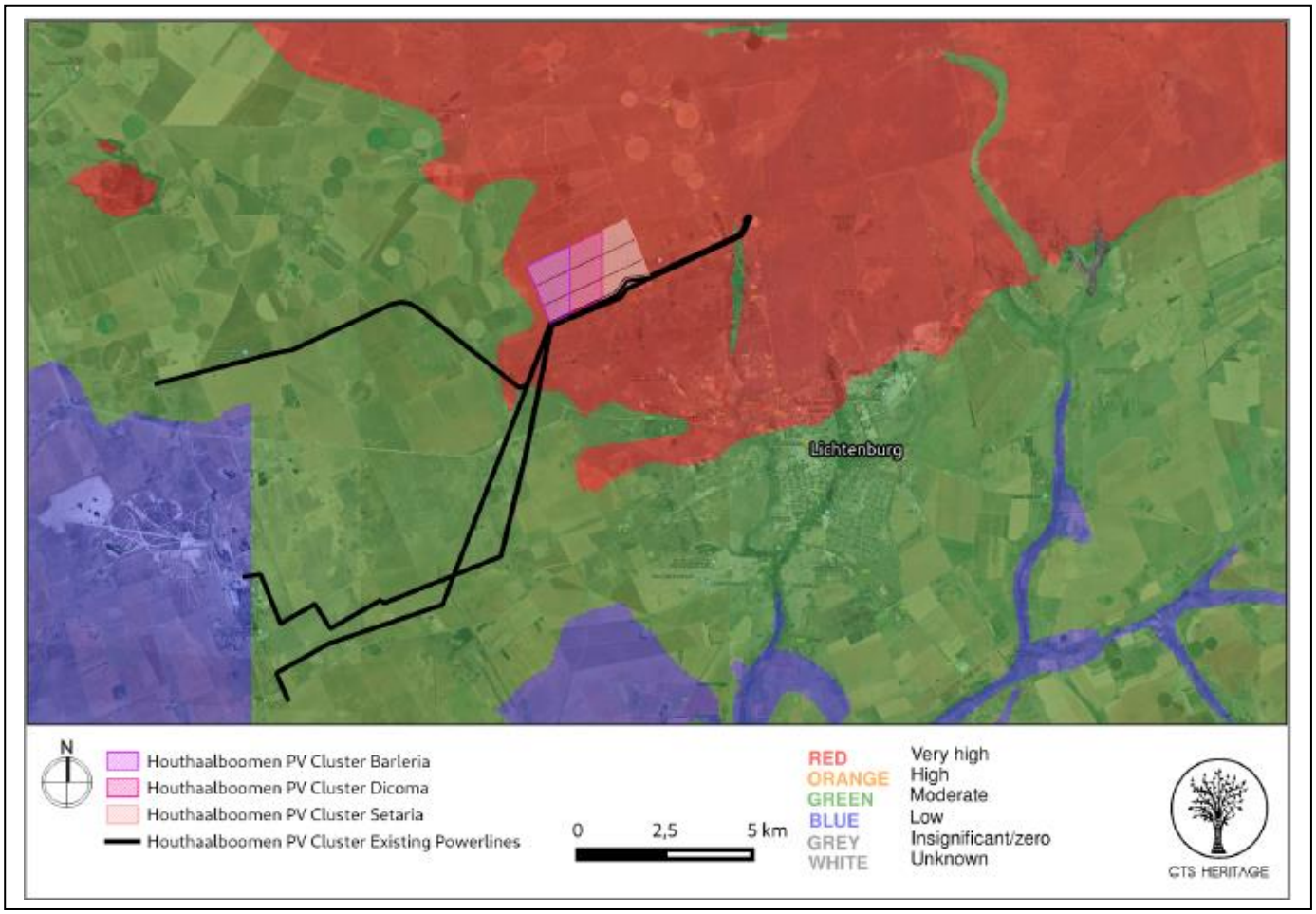


Figure 7.8: Palaeontological sensitivity of the proposed development area

7.5.2 Description of the Heritage Impacts

A number of heritage resources were identified. The stone age archaeological resources identified were all ex-situ and are of low heritage significance. Furthermore, a stone structure was identified within the development area. As it is likely that this is a burial site, the site is graded IIIA and a non-development buffer of 10m is recommended.

Based on the experience of the palaeontologist and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the loose sands of the Quaternary. No fossils were seen during the site survey and there were no rocky outcrops at all. There is a very small chance that stromatolites of the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) may occur below the ground surface and may be disturbed.

It is important to note that, although there were no other archaeological or heritage resources identified during the project survey, some archaeological material, including artefacts and graves can be buried underground and as such, may not have been identified during the initial survey and site visits. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately to determine a way forward.

7.5.3 Impact tables summarising the significance of impacts on heritage related to the PV facility and associated infrastructure during construction and operation (with and without mitigation)

Nature: Impacts on archaeology resources The construction phase of the project will require excavation, which may impact on heritage resources if present		
	Without mitigation	With mitigation
Extent	Localised within the site boundary (1)	Localised within the site boundary (1)
Duration	Where an impact to a resource occurs, the impact will be permanent (5)	Where an impact to a resource occurs, the impact will be permanent (5)
Magnitude	Two low significance artefact scatters and a possible burial was identified within the development area (8)	Two low significance artefact scatters and a possible burial was identified within the development area (8)
Probability	It is possible that significant burials will be impacted (5)	Improbable (1)
Significance	High (70)	Low (14)
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	Possible	Possible
Can impacts be mitigated?	Yes	
Mitigation: » A 10m no-go development area must be implemented around site LCTB013 » The Chance Fossils Finds Procedure which is attached as Appendix 3 of the Heritage Impact Assessment Report must be implemented		
Residual Impacts: Should any significant recourses be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.		

Nature: Impacts on palaeontology resources The construction phase of the project will require excavation, which may impact on heritage resources if present		
	Without mitigation	With mitigation
Extent	Localised within the site boundary (1)	Localised within the site boundary (1)
Duration	Where an impact to a resource occurs, the impact will be permanent (5)	Where an impact to a resource occurs, the impact will be permanent (5)
Magnitude	Loose sands do not preserve plant fossils; stromatolites are common trace fossils and not considered paleontologically important in this age deposit. They outcrop sporadically. The impact would be very unlikely. (2)	Loose sands do not preserve plant fossils; stromatolites are common trace fossils and not considered paleontologically important in this age deposit. They outcrop sporadically. The impact would be very unlikely. (2)
Probability	It is possible that significant burials will be impacted (1)	It is possible that significant burials will be impacted (1)
Significance	Low (08)	Low (08)
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Yes	
Mitigation: » A 10m no-go development area must be implemented around site LCTB013		

» The Chance Fossils Finds Procedure which is attached as Appendix 3 of the Heritage Impact Assessment Report must be implemented
Residual Impacts: Should any significant recourses be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.

7.5.4 Comparative Assessment of Alternatives

Grid connection alternatives

The grid connection alternatives were not considered during the heritage(including palaeontology and archaeology) impact assessment due to the fact that the construction of the grid connection solution will not result in any traffic impacts.

7.5.5 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of Dicoma PV will be low. From the outcomes of the studies undertaken, it is concluded that the PV facility can be developed. Although there were no other archaeological or heritage resources identified during the project survey; some archaeological material, including artefacts and graves can be buried underground and as such, may not have been identified during the initial survey and site visits. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately to determine a way forward.

7.6. Assessment of Visual Impacts

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

7.6.1 Results of the Visual Impact Assessment

The construction and operation of Dicoma PV and its associated infrastructure may have a visual impact on the area surrounding the project site, especially within (but not restricted to) a 1-3km radius of the facility. The visual impact will differ amongst places, depending on the distance from the facility.

Farm settlements or residences occur at irregular intervals throughout the area. Some of these in close proximity to the Dicoma PV project site, include:

- Houthaalboomen
- *Boskoppie*
- *Elandsfontein*
- *Brakpan*
- *Scherppunt*
- *Greeflaagte*

The Elandsfontein small holdings are located east of the farm identified for the PV facility. The population density of the region is indicated as approximately 19 people per km^2, predominantly concentrated within the town of Lichtenburg.

There are also a large number of existing power lines associated with the existing Eskom Watershed Substation located within the surrounding area of the project site. Besides the electricity transmission and distribution infrastructure, the project site and the surroundings are relatively undeveloped. The site is located in an area that has a distinct rural and agricultural character, with some mining/quarrying activity located south-east of the proposed development site at a distance of 5km at the closest.

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. The facility would be visible within an area that incorporates certain sensitive visual receptors who would consider visual exposure to this type of infrastructure to be intrusive. Such visual receptors include people travelling along roads and residents of rural homesteads and settlements (**Figure 7.9**).

7.6.2 Visual Assessment

Visual impacts will occur during the construction and operation of Dicoma PV.

The development would be quite easily visible within a 1km radius of the site. This area of visual exposure (0 – 1km) is generally restricted to vacant farmland and agricultural fields but may contain some potential sensitive visual receptors. This pattern of exposure is generally attributed to the flat topography of the study area, with no hills or ridges influencing or interrupting the viewshed analysis. There are two residences (Scherppunt 1 and Houthaalboomen) within this zone (respectively to the west and the east of the proposed PV facility). The latter residence is however located on the site earmarked for the proposed Dicoma PV facility.

Within a 1 – 3km radius, the visual exposure is more scattered and interrupted due to the undulating nature of the topography. Most of this zone falls within vacant open space and agricultural land but does include some farm dwellings and residences. Some of these include Scherppunt 2, and Houthaalboomen 1 and 2, as well as residences within the western section of the Elandsfontein small holdings. The R503 arterial road traverses a section of this zone to the south, where the facility may be visible.

Visibility between the 3 - 6km radii is greatly reduced but does include sections of the R505 and R503 arterial roads and a number of farm residences, namely Boskoppie, Elandsfontein, and Brakpan as well as the Elandsfontein small holdings.

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. The town of Lichtenburg is located beyond 6km from the facility, and although visibility my theoretically be possible, it is highly unlikely due to the built-up nature of the town.

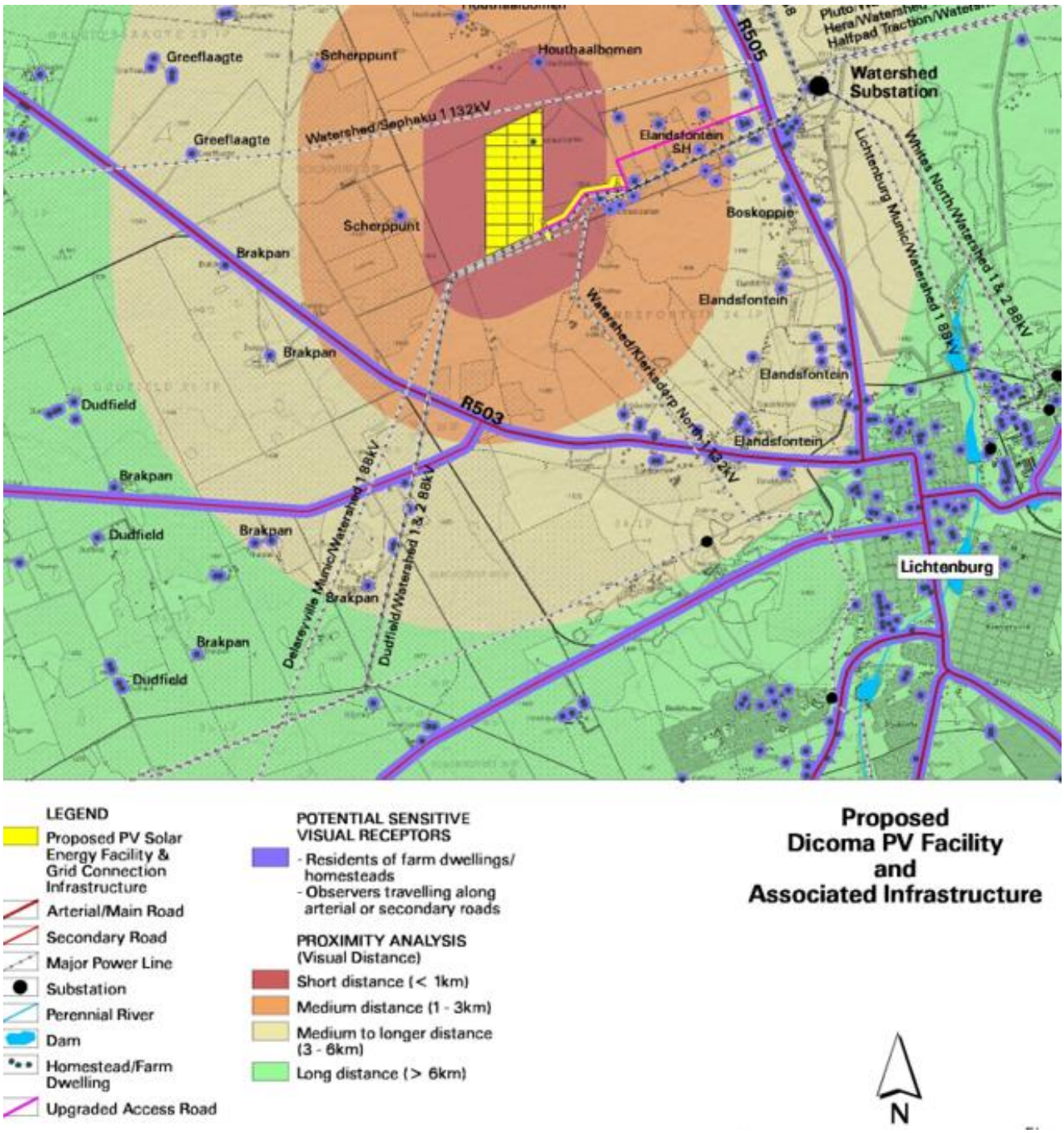


Figure 7.9: Potentially sensitive visual receptors in the area surrounding the site for the Dicoma PV facility.

Secondary visual impacts are also expected with the operation of Dicoma PV. These impacts include a visual impact on the sense of place of the region. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The greater environment has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development represents existing visual disturbances. The anticipated visual impact of Dicoma PV on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of low significance. This is due to the relatively low viewer incidence within close proximity to the project site.

7.6.3 Impact table summarising the significance of visual impacts during construction and operation (with and without mitigation)

During the construction phase, there may be a noticeable increase in heavy vehicles utilising the roads to the project site that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Construction activities may potentially result in a moderate, temporary visual impact, that may be mitigated to low.

During the operation phase there will be a moderate visual impact on observers (residents and road users) located between a 1-3km radius of the PV facility structures. Mitigation of this impact is possible and both specific measures as well as general "best practice" measures are recommended in order to reduce/mitigate the potential visual impact.

Visual impacts during the operation phase will also include lighting impacts relating to glare and sky glow[28]. The sky glow intensifies with the increase in the amount of light sources. It is possible that Dicoma PV may contribute to the effect of sky glow within the environment which is currently undeveloped.

The tables below are applicable to all alternatives under consideration for the project infrastructure.

Construction Phase Impacts

Nature: Visual impacts of construction activities on sensitive visual receptors in close proximity to the PV facility During construction, there may be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and landowners in the area.		
	Without mitigation	With mitigation
Extent	Local/ very short distance (4)	Local/ very short distance (4)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	Moderate (48)	Moderate (30)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (3)	Reversible (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning: » Retain and maintain natural vegetation immediately adjacent to the development footprint. Construction:		

[28] Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog.

» Ensure that vegetation is not unnecessarily removed during the construction phase. » Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible. » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. » Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). » Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. » Rehabilitate all disturbed areas immediately after the completion of construction works.
Residual Impacts: None, provided that rehabilitation work is carried out as specified.

Operation Phase Impacts

Nature: Visual impact on observers in close proximity to the proposed PV facility structures Visual impacts on residents of homesteads within 1km radius of the PV facility structures.		
	Without mitigation	With mitigation
Extent	Local/ very short distance (4)	Local/ very short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Moderate (48)	Moderate (42)
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/re-establish and maintain natural vegetation immediately adjacent to the development footprint. » Consult adjacent landowners in order to inform them of the development and to identify any (valid) visual impact concerns. » Investigate the potential to screen affected receptors sites (located within 1km of the facility) with planted vegetation cover. Operation: » 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: Visual impact of the PV facility structure within the region Visual impact on observers travelling along the roads and residents at homesteads within a 1 – 3km radius of the PV facility structures.		
	Without mitigation	With mitigation
Extent	Local/ very short distance (3)	Local/ very short distance (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Probable (3)

Significance	Moderate (45)	Moderate (39)
Status (positive 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: Planning: » Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. Operation: » 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: Lighting impacts Visual impact of lighting at night on sensitive visual receptors in close proximity to the PV facility.		
	Without mitigation	With mitigation
Extent	Local/ very short distance (4))	Local/ very short distance (4))
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	Moderate (48)	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: Planning and operation: » Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). » Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. » Make use of minimum lumen or wattage in fixtures. » Make use of down-lighters, or shielded fixtures. » Make use of Low-Pressure Sodium lighting or other types of low impact lighting. » Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

Nature: Solar glint and glare impacts The visual impact of solar glint and glare as a visual distraction and possible air/road travel hazard. The proposed Dicoma PV is not located near any airports or airfields.		
	Without mitigation	With mitigation
Extent	Local/ very short distance (4))	N/A
Duration	Long-term (4)	N/A
Magnitude	Low (4)	N/A
Probability	Improbable (2)	N/A
Significance	Low (24)	N/A
Status (positive or negative)	Negative	N/A

Reversibility	Reversible	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	N/A	
Mitigation: N/A		
Residual Impacts: N/A		

Nature: Solar glint and glare impacts The visual impact of solar glint and glare on residents of homesteads in close proximity to the PV facility.		
	Without mitigation	With mitigation
Extent	Local/ very short distance (4)	Local/ very short distance (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Moderate (42)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning and operation: » Use anti-reflective panels and dull polishing on structures. » Adjust tilt angles of the panels if glint and glare issues become evident. » If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

Nature: Visual impact of ancillary infrastructure (i.e. internal access roads, buildings, overhead powerlines) Visual impact of the ancillary infrastructure during the operation phase on observers in close proximity to the structures.		
	Without mitigation	With mitigation
Extent	Local/ very short distance (4)	Local/ 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 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.	
Mitigation: Planning: » Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/power line servitude. Operation: » 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.

Secondary Impacts

Nature: <u>Visual impact of the PV facility on the sense of place of the region</u> The greater environment has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development represents existing visual disturbances. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.		
	Without mitigation	With mitigation
Extent	Regional/ medium to longer distance (2)	Regional/ medium to longer distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	Low (20)	Low (20)
Status (positive or negative)	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.	
Mitigation: <u>Planning:</u> » Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. <u>Operation:</u> » Maintain the general appearance of the facility as a whole. <u>Decommissioning:</u> » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.		

7.6.4 Comparative Assessment of Alternatives

<u>Grid connection alternatives</u>

There is no preferential site alternative from a visual perspective, and both are considered to be acceptable.

<u>Aspect: Visual</u>		
Grid connection	**Alternative 1** (technically preferred) » Longer route (2.2km long)	**Alternative 2** » Shortest route (less than 1km) » Does not traverse near private dwellings
	» Acceptable	» Acceptable
Preferred alternatives from a visual perspective	Grid connection – Both considered acceptable	

Overall, the significance of the visual impacts is expected to range from moderate to low, depending on the impact being considered, as a result of the generally undeveloped character of the landscape. The following mitigation is possible:

» Mitigation of lighting impacts includes the pro-active design, planning and specification of lighting for the facility. The correct specification and placement of lighting and light fixtures for the proposed PV facility and ancillary infrastructure will go far to contain rather than spread the light. Mitigation measures include the following:

- Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself);
- Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights;
- Making use of minimum lumen or wattage in fixtures;
- Making use of down-lighters, or shielded fixtures;
- Making use of Low Pressure Sodium lighting or other types of low impact lighting.
- Making 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.

» Mitigation of visual impacts associated with the construction phase, albeit temporary, would entail proper planning, management and rehabilitation of the construction site. Recommended mitigation measures include the following:

- Construct temporary screens north of the PV plant construction site to shield construction activities from observers travelling along public roads.
- Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
- Reduce the construction period through careful logistical planning and productive implementation of resources.
- Plan the placement of laydown areas and any potential temporary construction 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 through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
- Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.

» Glint and glare impact mitigation measures include the following:

- Use anti-reflective panels and dull polishing on structures.
- Adjust tilt angles of the panels if glint and glare issues become evident.
- If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site.

7.7. Assessment of Social Impacts

Potential social impacts and the relative significance of the impacts associated with the development of Dicoma PV are summarised below (refer to **Appendix I**).

7.7.1 Results of the Social Impact Assessment

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 (~18 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 mis-management of the construction phase activities.

7.7.2 Description of Social Impacts

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
» Influx of jobseekers and change in population
» Safety and security impacts
» Impacts on daily living and movement patterns
» Nuisance impacts, including noise and dust
» Visual impacts and sense of place impacts

7.7.3 Impact tables summarising the significance of social impacts during construction and operation (with and without mitigation measures)

Construction Phase Impacts

Nature: Direct and indirect employment opportunities
It is anticipated that development of the PV Facility will result in the creation of approximately 50 full -time employment opportunities, comprising a mixture of skilled, semi-skilled and unskilled positions during the operational phase. Employment opportunities generated as a result of the project will be temporary in nature, and will last for the duration of the construction period (i.e. ~18 months). The general labour force will, as far as possible and where skills are available, be sourced from the local labour pool. Where relevant skills are unavailable from the local labour pool, these would need to be sought elsewhere. The injection of income into the area, albeit limited, in the form of wages will represent an opportunity for the local economy and businesses in the area.

Several indirect employment opportunities will also be created. Indirect employment opportunities will predominantly be created in the service industry, through the opportunity for the provision of secondary services to the construction team

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

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 local employment policy is adopted to maximise the opportunities made available to the local labour force. Dicoma (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 Ditsobotla Local Municipality, if this is not possible, then the broader focus areas should be considered for sourcing workers.
- » In the recruitment selection process; consideration must be given to women during recruitment process
- » It is recommended to set realistic local recruitment targets for the construction phase
- » Training and skills development programmes should be initiated prior to the commencement of the construction phase

Residual Impacts:

- » Improved pool of skills and experience in the local area
- » Temporary employment during the construction phase will result in job losses and struggles for construction workers to find new employment opportunities following the completion of construction.
- » Economic growth for small-scale entrepreneurs

Nature: Economic multiplier effects

Economic multiplier effects from the use of local goods and services opportunities include but are not limited to, the provision of construction materials and equipment, and workforce essentials such as services, safety equipment, ablution, accommodation, transportation and other goods. The increase in demand for goods and services may stimulate local business and local economic development (however locally sourced materials and services may be limited due to availability). There is likely to be a direct increase in industry and indirect increase in secondary businesses. The impact is likely to be positive, local to regional in extent, short-term, and of medium significance.

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

Enhancement measures:

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

Residual Impacts:

- » Improved local service sector which will result in a growth in local business.

Nature: Influx of jobseekers and change in population

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

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

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	Low (18)	Low (14)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

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

Residual Impacts:

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

Nature: <u>Safety and security impacts</u>

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

The labour force will not permanently reside within the construction site.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	Medium (30)	Low (20)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		

- Working hours must preferably be restricted to daylight hours during the construction phase. Where deviation of working hours is required, it must be approved by the relevant local authorities and surrounding landowners must be notified.
- All vehicles must be road worthy, and drivers must be licensed, obey traffic rules, follow speed limits and made aware of the potential road safety issues.
- Construction vehicles should be inspected regularly by the EPC contractor to ensure their road worthiness.
- Adequate and strategically placed traffic warning signs and control measures must be placed along the gravel farm access roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be visible at all times, and especially at night and must be maintained throughout the construction phase.
- Implement penalties for reckless driving as a way to enforce compliance to traffic rules.
- Avoid heavy vehicle activity through residential areas during "peak" hours (when children are taken to school, people driving to work, etc.).
- The developer and EPC contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed or damaged due to construction activities.
- The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if damaged (i.e. wear and tear) due to construction activities.
- A protocol for communication must be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.
- Undertake information sessions with the surrounding communities, and affected and adjacent landowners, prior to construction in order to ensure that communities are fully informed of the project to be developed in its final form. This must be undertaken through the appointment of a CLO.
- The placement of the power line route within the grid connection must avoid the sensitive land uses undertaken by the affected landowners as far as possible. Consultation with the affected landowners must be undertaken in this regard.

Residual Impacts:
None anticipated

Nature: <u>Disruption on daily living and movement patterns</u>
Project components and equipment will be transported using road transport. Increased traffic due to the movement of construction vehicles could cause disruptions to the local community and increase safety hazards. The use of l roads (R505 and gravel road D2435) and transport systems may cause road deterioration and congestion. This impact will be magnified since farm roads are not designed to carry heavy traffic and are prone to erosion. Noise, vibrations, dust and visual pollution from heavy vehicle traffic and construction activities during the construction phase could also negatively impact local residents and road users.
The labour force will not permanently reside within the construction site..

	Without mitigation	With mitigation
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Medium (39)	Medium (33)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:
- Working hours must preferably be restricted to daylight hours during the construction phase. Where deviation of working hours is required, it must be approved by the relevant local authorities and surrounding landowners must be notified.
- All vehicles must be road worthy, and drivers must be licensed, obey traffic rules, follow speed limits and made aware of the potential road safety issues.
- Construction vehicles should be inspected regularly by the EPC contractor to ensure their road worthiness.
- Adequate and strategically placed traffic warning signs and control measures must be placed along the gravel farm access roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be visible at all times, and especially at night and must be maintained throughout the construction phase.
- Implement penalties for reckless driving as a way to enforce compliance to traffic rules.

- » Avoid heavy vehicle activity through residential areas during "peak" hours (when children are taken to school, people driving to work, etc.).
- » The developer and EPC contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed or damaged due to construction activities.
- » The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if damaged (i.e. wear and tear) due to construction activities.
- » A protocol for communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
- » Undertake information sessions with the surrounding communities, and affected and adjacent landowners, prior to construction to ensure that communities are fully informed of the project to be developed in its final form. This must be undertaken through the appointment of a CLO.
- » The placement of the power line route within the grid connection corridor must avoid the sensitive land uses undertaken by the affected landowners as far as possible. Consultation with the affected landowners must be undertaken in this regard.

Residual Impacts:
None anticipated

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

	Without mitigation	With mitigation
Extent	Local (1)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	Medium (44)	Low (27)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:
- » The movement of heavy vehicles associated with the construction phase through populated areas should be timed to avoid weekends, public holidays and holiday periods, where feasible.
- » Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- » A speed limit of 40km/hr should be implemented on gravel roads.
- » Ensure all vehicles are road worthy, drivers are licensed and are made aware of the potential noise and dust issues.
- » A CLO 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.
- » A stakeholder management plan must be implemented by the EPC contractor to address neighbouring farmer concerns regarding safety and security.

Residual Impacts:
- » None anticipated

Nature: Visual impacts

Intrusion impacts such as aesthetic pollution (i.e. building materials, construction vehicles, etc.), noise and light pollution will impact the "sense of place" for the local community. Construction related activities have the potential to negatively impact a local area's "sense of place". Such an impact is likely to be present during the construction phase. It is envisaged that the structures, where visible from shorter distances (e.g. less than 1km and potentially up to 3km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. This may include residents of the farm dwellings mentioned above, as well as observers travelling along the R503 arterial road in closer proximity to the facility.

The incidence rate of sensitive visual receptors is however expected to be quite low, due to the generally remote location of the proposed development, the low number of potential observers and the assumed support of (most of) the land owners to the solar energy facility developments. This assumption is based on the number of applications for solar energy facilities in the study area. (Appendix H of the EIA report).

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short term (1)	Short term (2)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	Moderate (28)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

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

Residual Impacts:
None anticipated

Operation Phase Impacts

The potential positive and negative social impacts that could arise because of the operation of the proposed project include the following:

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

Nature: Direct and indirect employment opportunities and skills development
Given the location of the proposed facility the majority of permanent staff is likely to reside in Lichtenburg. In terms of accommodation options, a percentage of the non-local permanent employees may purchase houses in Lichtenburg, while other may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage

of the monthly wage bill earned by permanent staff would be spent in the regional and local economy, which will benefit local businesses in these towns. The benefits to the local economy will extend over the operational lifespan of the project.

The local hospitality industry in Lichtenburg would also benefit from the operations phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians, etc.) who are involved in the company and the project but who are not limited to day-to-day operations

	Without enhancement	With enhancement
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly probable(4)	Definite (5)
Significance	Medium (44)	Medium (55)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

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, Govan Mbeki 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.

Residual Impacts:

» Improved pool of skills and experience in the local area.

Nature: <u>Development of non-polluting, renewable energy infrastructure</u>

South Africa currently relies predominantly on coal-generated electricity to meet its energy needs. As a result, the country's carbon emissions are considerably higher than those of most developed countries partly because of the energy-intensive sectors which rely heavily on low quality coal, which is the main contributor to GHG emissions. The use of solar technology for power generation is considered a non-consumptive use of a natural resource which produces zero GHG emissions during its operation. The generation of RE utilising solar power will contribute positively to South Africa's electricity market. Given South Africa's reliance on Eskom as a power utility, the benefits associated with a REIPPP Programme are regarded as an important contribution, and the advancement of RE has been identified as a priority for South Africa.

Increasing the contribution of the RE sector to the local economy would contribute to the diversification of the local economy and provide greater economic stability. The growth in the RE sector as a whole could introduce new skills and development into the area. This is especially true with regards to solar power specifically considering the number of other solar power projects proposed within the broader area.

The development of RE projects have the potential to contribute to the stability of the economy, and could contribute to the local economy through employment generation (direct, indirect, and local service providers) and revenue generation for the LM. While the overall contribution of the project to South Africa's total energy requirements is small, the facility will also contribute towards offsetting the total carbon emissions associated with energy generation in South Africa. It should however be noted that such a benefit is associated with all RE projects and not only solar power projects in particular

	Without enhancement	With enhancement
Extent	Local-Regional-National (4)	Local-Regional-National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (50)	Medium (50)
Status (positive or negative)	Positive	Positive

Reversibility	Yes	Yes
Irreplaceable loss of resources?	Yes (impact of climate change)	Yes (impact of climate change)
Can impacts be mitigated?	No	
Enhancement measures: None identified		
Residual Impacts: » Reduce carbon emissions through the use of renewable energy and contribute to reducing global warming.		

Nature: Contribution to Local Economic Development (LED) and social upliftment

Projects which form part of the DMRE's REIPPP Programme are required as part of their bidding requirements, to contribute towards LED and social upliftment initiatives within the area in which they are proposed. In addition, they are required to spend a percentage of their revenue on socio-economic and enterprise development, as well as allocate ownership shares to local communities that benefit previously disadvantaged communities around the project. A portion of the dividends generated by each development also need to be invested into LED projects and programmes. The proposed development therefore has the potential to contribute positively towards socio-economic development and improvements within the local area.

Socio-economic spin-offs from the proposed development could therefore contribute towards better infrastructure provision, and the investment in education and skills development. An in-depth Community Needs Assessment (CNA) is required to ensure that the beneficiary community's needs are understood and sufficiently addressed by the proposed development programmes in order to contribute meaningfully towards local economic growth and development. It should be noted however that such a benefit would be associated with all RE projects and not just solar power projects in particular.

	Without enhancement	With enhancement
Extent	Local-Regional-National (4)	Local-Regional-National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (50)	Medium (64)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Enhancement measures:

» A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful.
» Ongoing communication and reporting is required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused.
» The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).

Residual Impacts:

» Social upliftment of the local communities through the development and operation of the project.

Nature: Visual and sense of place impacts

An area's sense of place is created through the interaction of various characteristics of the environment, including atmosphere, visual resources, aesthetics, climate, lifestyle, culture, and heritage. An area's sense of place is however subjective and largely dependent on the demographics of the population residing within the area and their perceptions regarding trade-offs. For example, while some individuals may prefer not to see any form of infrastructure development, others may be interested in large-scale infrastructure, or engineering projects and consider the impact to be less significant. Such a scenario may be true given that one of the main economic sectors within the area is mining which has altered the landscape from natural to industrial.

Given the location of the corridor within an area characterised as having a low-medium population density, and given the project's location within close proximity to existing operational and visible grid infrastructure and other industrial

developments, the visual impact and impact on the area's sense of place associated with the construction of the proposed project, from a social perspective, is anticipated to be of a very limited significance.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (36)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Maintain and manage the associated infrastructure to be in a good and neat condition to ensure that no degradation of the area and the associated infrastructure servitude takes place and impacts the visual quality of the area. » Implement the relevant mitigation measures as recommended in the Visual Impact Assessment.		
Residual Impacts: » The visual impact of the PV facility will remain until the infrastructure is completely decommissioned and removed. Thereafter the impact will be removed.		

Nature: Impacts associated with the loss income from agricultural land Loss of agricultural land and overall productivity because of the operation of the proposed project on an agricultural property. The development footprint on which the solar energy facility will be developed will be removed from agricultural production.		
	Without mitigation	With mitigation
Extent	Local (1)	Local-regional (2)
Duration	Long-term (3)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable(3)	Improbable (2)
Significance	Medium (33)	Medium (20)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: * Keep the project footprint as small as possible. * Avoid interference with current agricultural activities undertaken within the affected properties.		
Residual Impacts: » None expected to occur.		

7.7.4 Comparative Assessment of Alternatives

Grid connection alternatives

The grid connection alternatives were not considered during the traffic impact assessment due to the fact that the construction of the grid connection solution will not result in any traffic impacts.

7.7.5 Implications for Project Implementation

The social impacts identified (including all positive and negative impacts) will be either of a low or medium significance with the implementation of the mitigation measures recommended. These recommendations include:

- A Community Liaison Officer (CLO) must be appointed to assist with the management of social impacts and to deal with community issues, if feasible.
- 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.
- It is recommended that local labour be sourced, wherever possible, to ensure that benefits accrue to the local communities. Efforts should be made to involve local businesses during the construction phase where possible.
- Local procurement of services and equipment is required where possible to enhance the multiplier effect.
- Employ mitigation measures to minimise the dust and noise pollution and damage to existing roads.
- Safety and security risks should be considered during the planning / construction phase of the proposed project. Access control, security and management should be implemented to limit the risk of crime increasing in the area.

7.8. Assessment of Impacts on Traffic

Potential traffic impacts and the relative significance of the impacts associated with the development of Dicoma PV are summarised below (refer to **Appendix J**).

7.8.1 Results of the Traffic Impact Assessment

During the construction phase, it is estimated that the total number of trips that will be generated over the twelve (12) month period will be approximately 19039 trips. The calculated number of trips during construction phase will be insignificant when compared to the Average Daily Traffic. The significance of the traffic impacts during construction will be low and no mitigation measures will be necessary.

During the operation phase assuming that the PV facility will be in operation for 20 to 30 years with an operational team of approximately 50 people. The traffic impact during the operational phase will therefore be insignificant , as approximately 50 people will be working at the solar plant. No other trips are expected to be generated during the operation phase and therefore the additional traffic is not considered to have a significant effect on the internal roads or the access roads and surrounding areas.

7.8.2 Description of Traffic Impacts

Access to the site will be via an existing gravel District Road (D2435) of approximately 2.5 km in length, which will need to be upgraded to cater for the construction vehicles navigating the road to the laydown areas on site. This gravel road will need to be suitably maintained. Regravelling may be necessary as a maintenance measure, from time to time, throughout the operational life of the solar power plant.

The traffic impacts will be highest during the construction phase with the movement of vehicles to and from the project site. This includes the transportation of the project components and employees to the project site during the construction phase.

The traffic impacts during the operation phase will mainly relate to the transportation of the limited staff to the project site, including the operation and maintenance team.

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

Construction Phase Impacts

Nature: Delivery and construction trips on transportation routes The delivery and construction trips will be insignificant when compared to the Average Daily Traffic and will not affect the existing Level of Service from two preferred harbour (Saldanha or Durban)		
	Without mitigation	With mitigation
Extent	Regional (1)	Regional (1)
Duration	Short term (1)	Short term (1)
Magnitude	Small (0)	Small (0)
Probability	Highly probable (4)	Highly probable (4)
Significance	Low (8)	Low (8)
Status (positive or negative)	Neutral	Neutral
Reversibility	Completely	Completely
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » N/A		

Nature: Commuter trips on Local traffic It is expected that the communities of Lichtenburg and Mafikeng will participate in the construction phase of the Dicoma Solar Energy Facility. They will access the project site via an existing gravel road (D2435) which tees-off from the R505 regional road The estimated additional traffic generated by the construction staff, when travelling to and from the Dicoma PV facility can be accommodated on the existing access roads.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (28)	Low (10)
Status (positive or negative)	Neutral	Neutral
Reversibility	Completely	Completely
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » N/A		

Operation & Decommissioning Phase Impacts

The traffic generated during the operational and decommissioning phase will be minimal and will not have any impact on the surrounding road network.

7.8.4 Comparative Assessment of Alternatives

Grid connection alternatives

The grid connection alternatives were not considered during the traffic impact assessment due to the fact that the construction of the grid connection solution will not result in any traffic impacts.

7.8.5 Implications for Project Implementation

The significance of the traffic impacts associated with traffic will be low and no mitigation measures will be required.

The access point to the site is situated off Regional Road R505. The formalisation of this access point, to the required standard, will be as part of the wayleave approval of Ditsobotla Local Municipality and North West : Department of Public Works and Roads. .

7.9 Risks Associated with Battery Energy Storage (BESS)

An Battery Energy Storage Systems BESS) comprising an 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 7.10 provides** a general illustration of a BESS.

Figure 7.10 Example of battery storage units integrated as part of PV array (Source: nexttracker.com)

The risks associated with battery technologies are generally well understood and researched. The primary risks relate to fire hazards and the potential for a condition known as 'thermal runaway'. Thermal runaway occurs in situations where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result. The risks detailed in the table below considers only the risks associated with on-site use of battery energy storage systems for PV facilities.

Possible risks associated with the construction and operation of the BESS from a technical perspective within the development footprint of the Dicoma PV facility are limited to health and safety aspects during the project life cycle of the BESS as well as the solar energy facility. The risks identified for the construction and operation of the BESS are detailed below. Mitigation measures have been included within the project EMPr (**refer to Appendix L**).

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
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. » 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.

Nature of Risk	*Likelihood*	*Impact*	*Mitigation / Management of Risk*
			» 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.

7.9. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing Dicoma PV. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities of a PV facility.

a) Land use and agriculture

Cattle farming is a viable long-term land use of the site as long as the field quality is maintained by never exceeding the grazing capacity. Small stock (goats and sheep) as well as game farming may also be viable land use options for the project site

The implementation of the 'do-nothing' alternative would leave the land-use restricted to the current agricultural activities, losing out on the opportunity to generate renewable energy from solar energy as additive thereto (i.e. current agricultural activities would continue). Therefore, from a land-use perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of a viable and compatible land use for the project site which allows the current land-use activities to continue.

In addition, the landowner would obtain an income from the 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 landowner which could in turn contribute to the financial viability of the farming practices on the project site. The implementation of the 'do nothing' alternative would retain the current land-use, fore-going the opportunity to generate renewable energy from the solar resource and supplementing the income of the landowner.

The 'do nothing' alternative would result in a lost opportunity for the landowner (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 potential of the project site.

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 Lichtenburg area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- There would also 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.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited.

Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of socio-economic benefits, when considering the current socio-economic conditions of the area.

New Business: Some of the positive spin off effects that are to ensue from the project expenditure will be localised in the communities located near the site, such as the town of Lichtenburg. 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 PV facility, albeit for a temporary period, will be lost with the implementation of the 'do nothing' alternative. Therefore from a business perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of new business opportunities.

Employment: At the peak of construction, the project is likely to create a maximum of 350 employment opportunities. These employment opportunities will be temporary and will last for a period of approximately 12 to 18 months (i.e. the length of construction). Employment opportunities generated during the construction phase will include low skilled, semi-skilled, and skilled opportunities. Solar PV projects make use of high levels of unskilled and semi-skilled labour so there will be good opportunity to use local labour, where available. Employment opportunities will peak during the construction phase and significantly decline during the operation phase. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area. The majority of the labour force is expected to be sourced from the surroundings towns. The employment opportunities for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

Skills development: The establishment of Dicoma PV will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various PV facilities are proposed to be developed in the area 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 PV facilities have been constructed and operated within the Province and the rest of the country. The skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

Municipal goals: The implementation of Dicoma PV would contribute towards addressing the Ditsobotla Local Municipality's key issue regarding high levels of poverty and unemployment, skills shortage, and inequalities, through the creation of employment opportunities, the provision of skills training opportunities, and local economic growth, including growth in personal income levels of those community members who would be employed on the project. The municipal goals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

The no-go alternative will therefore result in the above economic benefits not being realised and a subsequent loss of income and opportunities to local people. From this perspective the no-go alternative is not preferred.

c) Regional scale impact

At a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. The North West has an ample solar resource. Although Dicoma PV is only proposed to contribute a contracted capacity of up to75MW to the grid capacity, this would assist in meeting the electricity demand throughout the country and would also assist in meeting the government's goal for renewable energy and the energy mix. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

- Increased energy security;
- Resource saving (i.e. fossil fuels and water);
- Exploitation of South Africa's significant renewable energy resource;
- Pollution reduction;
- Climate friendly development;
- Support for international agreements;
- Employment creation;
- Acceptability to society; and
- Support to a new industry sector.

At present, South Africa is some way off from fully exploiting the diverse gains from renewable energy and from achieving a considerable market share in the renewable energy industry. South Africa's electricity supply remains heavily dominated by coal-based power generation, with the country's significant renewable energy potential largely untapped to date.

The Integrated Resource Plan (IRP) includes 17.8GW of renewables, 9.6GW of nuclear, 6.25GW of coal, and approximately 8.9GW of other generation sources such as hydro, and gas. Based on the Draft IRP 2018 there is currently 1 474MW of installed PV capacity, while an additional 814MW has been committed between 2020 and 2022, and an additional 5 670MW capacity has been allocated between 2025 and 2030. This plan is however yet to be finalised and promulgated. The IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies.

d) Conclusion

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government due to competition in the sector, and the number of renewable energy projects being bid to the Department of Energy. However, as the project site experiences ample solar resource and optimal grid connection opportunities are available, not developing Dicoma PV would see such an opportunity being lost. As current land use activities can continue on the project site once the project is operational, the loss of the land to this project during the operation phase is not considered significant. In addition, the North West Province will not benefit from additional generated power being evacuated directly into the province's grid. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with Dicoma PV. All impacts associated with the project can be mitigated to acceptable levels. If the PV 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 Dicoma PV.

CHAPTER 8: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 7, a PV facility and the associated infrastructure may have effects (positive and negative) on the natural and social environments and on the people living in a project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with Dicoma PV largely in isolation (from other similar developments).

The DMRE, under the REIPPP Programme, released in 2011 a request for proposals (RFP) to contribute towards Government's renewable energy target and to stimulate the industry in South Africa. The REIPPP Programme has been rolled out in bid windows (rounds) over the past 11 years, in which developers submit planned renewable energy projects for evaluation and selection. The bid selection process considers a number of qualification and evaluation criteria. The proposed tariff and socio-economic development contributions by the project bidder are the main basis for selection after the qualification criteria have been met.

As a result of the REIPPP Programme, there has been a substantial increase in interest in PV facility developments in South Africa (largely in the Northern Cape and North West Provinces), with a number of PV facilities selected as Preferred Bidder projects. It is, therefore, important to follow a precautionary approach in accordance with NEMA to ensure that the potential for cumulative impacts[29] are considered and avoided where possible.

This chapter assesses the potential for the impacts associated with the project to become more significant when considered in combination with the other known or proposed PV facility projects within the area.

8.1 Approach taken to Assess Cumulative Impacts

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

- Unacceptable loss of threatened or protected vegetation types, habitat or species through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning;
- Unacceptable risk to avifauna through habitat loss, displacement, collision and interaction with power infrastructure;
- Unacceptable loss of high agricultural potential areas presenting a risk to food security and increased soil erosion;
- Unacceptable loss of heritage resources;
- Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion;
- Unacceptable impact to socio-economic factors and components; and
- Unacceptable risk and degradation due to traffic related impacts.

[29] Cumulative impacts in relation to an activity are defined in the Environmental Impact Assessment Regulations (Government Notice R326) as the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by PV facility developments throughout South Africa, while the significance of the cumulative impact on visual amenity may only be influenced by PV facility developments that are in closer proximity to each other. For practical purposes a sub-regional scale of 30km has been selected for this cumulative impact evaluation.

Figure 8.1 indicates the location of Dicoma PV in relation to all other known and viable PV facilities (i.e. projects with a valid Environmental Authorisation) located within a radius of 30km from the project site. These projects were identified using the Department of Forestry, Fisheries and the Environment Renewable Energy Database and current knowledge of projects being proposed in the area. In the case of Dicoma PV, there are five (5) authorised PV facilities located within a 30km radius of the project site, as well as two new 75MW PV solar energy facilities proposed for development (refer to **Figure 8.1** and **Table 8.1**). The potential for cumulative impacts is summarised in the sections that follow and has been considered within the specialist studies (refer to **Appendices D – J**).

Table 8.1: PV facilities located within the broader area (within a 30km radius) of the Dicoma PV project site

Project Name	DEA Reference Number(s)	Approximate distance from Dicoma PV	Project Status
Lichtenburg 1 Solar PV (75MW)	14/12/16/3/3/2/1091	~8.8 km north-east	Environmental Authorisation issued
Lichtenburg 2 Solar PV (75MW)	14/12/16/3/3/2/1092	~ 5.4 km north-east	Environmental Authorisation issued
Lichtenburg 3 Solar PV (75MW)	14/12/16/3/3/2/1093	~ 7.7 km north-east	Environmental Authorisation issued
Tlisitseng PV cluster 2 (75MW)	14/12/16/3/3/2/975	~9.8 km south-west	Environmental Authorisation issued
Hibernia Solar Energy Facility (5MW)	14/12/16/3/3/2/557	~9.8 km south-west	Environmental Authorisation issued
Lichtenburg Solar Park	14/12/16/3/3/2/270	~ 5 km north-east	Environmental Authorisation issued
Lerato Solar Power Plant (Sub solar PV cluster)	14/12/16/3/3/2/2084	~ 10.5 km north-east	Environmental Authorisation Application in Process
Boitumelo Solar Power Plant (Sub solar PV cluster)	14/12/16/3/3/2/2083	~ 10.5 km north-east	Environmental Authorisation Application in Process
Kutlwano solar power plant (Sub solar PV cluster)	14/12/16/3/3/2/2085	~ 10.5 km north-east	Environmental Authorisation Application in Process
Setaria PV Facility	14/12/16/3/3/2/2106	Directly adjacent	Environmental Authorisation Application in Process
Barleria PV Facility	14/12/16/3/3/2/2108	Directly adjacent	Environmental Authorisation Application in Process

It should be noted that not all the PV facilities presently under consideration by various solar energy developers will be built for operation. Not all proposed developments will be granted the relevant permits by the relevant authorities (DFFE, DMRE, NERSA and Eskom) due to the following reasons:

» There may be limitations to the capacity of the existing or future Eskom grid;

- Not all applications will receive a positive environmental authorisation;
- There are stringent requirements to be met by applicants in terms of the REIPPP Programme and a highly competitive process that only selects the most competitive projects;
- Not all proposed PV facilities will be able to reduce the associated negative impacts to acceptable levels or be able to mitigate the impacts to acceptable levels (fatally flawed);
- Not all proposed facilities will eventually be granted a generation license by NERSA and sign a Power Purchase Agreement with Eskom; and
- Not all developers will be successful in securing financial support to advance their projects further.

As there is therefore a level of uncertainty as to whether all the above-mentioned PV facilities will be implemented, this results in it being difficult to quantitatively assess the potential cumulative impacts. The cumulative impacts of other known PV facilities in the broader area and Dicoma PV are therefore qualitatively assessed in this Chapter. The following potential impacts are considered:

- Cumulative Impacts on Ecological
- Cumulative Impacts on Avifauna
- Cumulative Impacts on Land use, soil and agricultural potential
- Cumulative Impacts on Heritage Resources
- Cumulative Visual Impacts
- Cumulative Socio-economic Impacts
- Cumulative Traffic Impacts

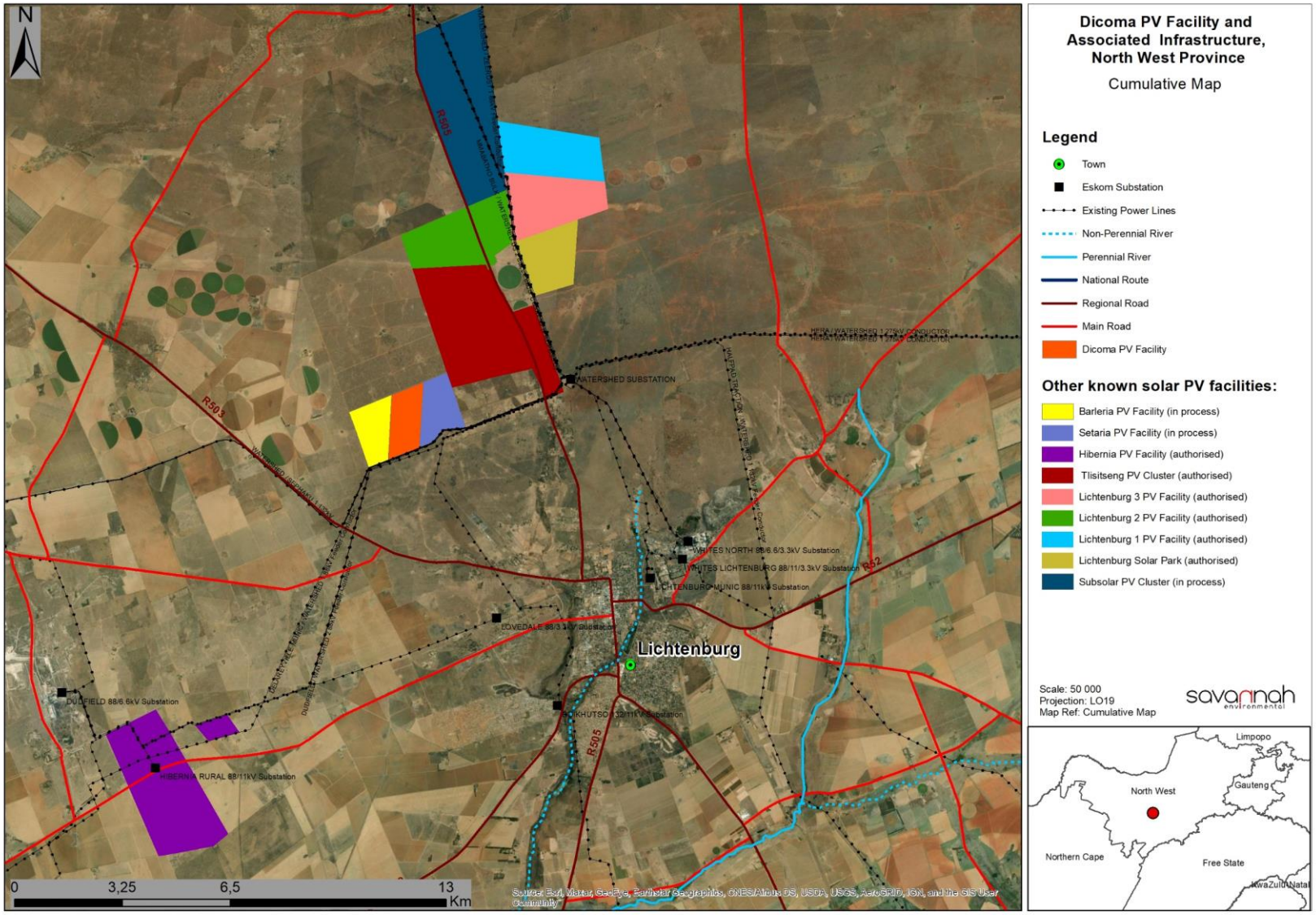


Figure 8.1: Identified PV facility projects located within a 30km radius of the Dicoma PV project site that are considered as part of the cumulative impact assessment for the Dicoma PV project

8.2 Cumulative Impacts on Ecological

Cumulative impacts associated with Dicoma PV and associated infrastructure have been identified by the ecological specialist (refer to **Appendix D**). These impacts include the following:

- The loss of vegetation types on a cumulative basis from the broad area may impact the Country's ability to meet its conservation targets.
- Transformation of intact, sensitive habitats could compromise the ecological functioning of these habitats and may contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.
- The loss of biodiversity may be exacerbated.
- Invasion of exotics and invasive species into the broader area may also potentially be exacerbated.

Cumulative impacts from an ecological perspective include the loss of unprotected vegetation types on a cumulative basis and loss of habitat. Minimal transformation of intact, sensitive habitats. These impacts could compromise the ecological functioning of these habitats and may contribute to the further fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

Impact: *Reduced ability to meet conservation obligations and targets*
Nature: The loss of unprotected vegetation types on a cumulative basis from the broader area impacts the Country's ability to meet its conservation targets.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (3)
Duration	Long Term (4)	Long-Term (4)
Magnitude	Small (1)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (12)**	**Low (22)**
Status (positive or negative)	Slightly Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

- The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas.
- An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.
- Reduce the footprint of the facility within sensitive habitat types as much as possible.

Impact: *Impacts on Critical Biodiversity Areas and broad-scale ecological processes.*
Nature: Transformation of intact habitat could potentially compromise ecological processes of ESAs as well as ecological functioning of important habitats and would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

	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	Long Term (4)	Long Term (4)
Magnitude	Small (1)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (12)**	**Low (20)**

Status (positive or negative)	Neutral – Slightly Negative	Slightly Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	Likely
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

» The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas.
» An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.
» Reduce the footprint of the facility within sensitive habitat types as much as possible.
» Small to medium sized mammals can be allowed to move between the development area and surrounding areas by creating artificial passageways underneath boundary fences (this is optional and may be implemented by developer if deemed necessary).

Impact: *Potential cumulative impacts on habitat loss due to nearby renewable energy developments (solar energy facilities)*

Nature: Cumulative loss of habitats (including sensitive habitats) and further increase in the fractured nature of the landscape may lead to the loss of features responsible for maintaining biodiversity and providing ecosystem goods and services and may potentially lead to;

» A change in the status of the Vegetation Unit, subsequently also reducing the ability to meet national conservation obligations and targets;
» A reduction in biodiversity and even the loss of some species from the area;
» Fracturing and isolation of landscapes may cut off important migration routes and prevent genetic variability thus reducing "genetic health" which may in turn lead to weaker species incapable to adapt and react to potential environmental changes and consequently also to a reduction in biodiversity and the extinction of some species from certain areas.
» The loss of ESA's which may lead to the province being incapable to meet their required biodiversity pattern a process targets.
» The loss of important corridors essential for some species to allow for movement between important habitat types crucial for the survival of these species.

	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	Long Term (4)	Long Term (4)
Magnitude	Small (1)	Low (4)
Probability	Very Improbable (1)	Improbable (2)
Significance	**Low (6)**	**Low (20)**
Status (positive or negative)	Neutral	Slightly Negative
Reversibility	Low	Likely
Irreplaceable loss of resources?	No	Moderate Probability
Can impacts be mitigated?	Yes, to a large extent	

Mitigation:

» The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas.
» An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.
» Reduce the footprint of the facility within sensitive habitat types as much as possible.
» Small to medium sized mammals can be allowed to move between the development area and surrounding areas by creating artificial passageways underneath boundary fences (this is optional and may be implemented by developer if deemed necessary).

8.3 Cumulative Impacts on Avifauna

Cumulative impacts from an avifauna perspective include exacerbated displacement and loss of habitat. In addition, the grid connection (via overhead power lines) of these facilities with high voltage lines south and east of the Dicoma PV project site will increase the probability of bird strikes with power lines and avian mortalities due to collision and electrocution.

The cumulative avifauna impacts, considering the development of Dicoma PV and the PV facilities within the surrounding area will be of a low to medium significance, depending on the impact being considered.

Nature: *Habitat loss* The development of Dicoma PV and the other PV facilities will cause regional losses of natural habitat, as well as the subsequent displacement of birds.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Regional (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Medium (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, to some extent	
Mitigation: » The best practicable mitigation will be to consolidate infrastructure (e.g. proposed power lines) to areas where existing impacts occur (e.g. placing the proposed power line alongside existing power lines). » The development footprint of the various individual facilities must be kept as small as possible and sensitive habitats must be avoided.		

Nature: *Collision – PV panels* Avian collision impacts (i.e. collision impacts with the PV panels) are expected during the operation phase of Dicoma PV and other PV facilities.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local and immediate surroundings (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Moderate (6)
Probability	Improbable (2)	Probable (2)
Significance	**Low (16)**	**Low (26)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No, although threatened species are present in the area, these are likely to become displaced while waterbirds are uncommon due to the absence	No, although threatened species are present in the area, these are likely to become displaced while waterbirds are uncommon

	of prominent water/wetland features in the area.	due to the absence of prominent water/wetland features in the area
Can impacts be mitigated?	Yes, to some extent	
Mitigation:		
» Apply bird deterrent devices to the panels for birds that may mistake the panels for open water and to prevent them from landing on the panels.		

Nature: *Collision – Grid Infrastructure*

Avian collision impacts (i.e. collision impacts with the overhead power lines) are expected during the operation phase of Dicoma PV and other PV facilities owing to the increase in the number of grid line connections which would be required for multiple projects in one area.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Regional (4)	Regional (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Highly Probable (4)
Significance	**Medium (48)**	**High (64)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes, impact could still occur irrespective of mitigation.	Yes, owing to the potential loss of critically endangered or endangered bird species.
Can impacts be mitigated?	Yes, to some extent	

Mitigation:

» Apply bird deterrent devices to the power line and make use of "bird-friendly" pylon structures.
» Plan for construction of new power lines parallel to existing lines as far as possible.
» To aid post-construction monitoring and/or monitoring of bird mortality rates, it is advised to conduct direct observations and carcass searches on a regular and systematic basis.
» As a priority, all new power lines should be marked with bird diverters.

Nature: *Electrocution*

During the operation phase of Dicoma PV and other PV facilities in the area, avian electrocution related to the overhead power lines is expected to occur owing to the increase in the number of grid line connections which would be required for multiple projects in one area.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Immediate area (3)	Regional (4)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Highly Probable (4)
Significance	**Medium (45)**	**High (64)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes, impact could still occur irrespective of mitigation.	Yes, owing to the potential loss of critically endangered or endangered bird species.
Can impacts be mitigated?	Yes, to some extent	

Mitigation: » Make use of bird-friendly pylons and bird guards. » As far as possible, position electrical infrastructure in close proximity to existing similar infrastructure.

8.4 Cumulative Impacts on Land Use, Soil and Agricultural Potential

Cumulative impacts from a soils perspective are related to an increase in the loss of agricultural land used for livestock farming and cultivation, as well as an increased risk of erosion. These impacts can be reduced by keeping the footprints of the PV facilities minimised where possible and strictly following soil management measures pertaining to erosion control and management and monitoring of any possible soil pollution sources such as vehicles traversing over the sites.

Nature: *Decrease in areas with suitable land capability for cattle farming.*
With the development of the Dicoma PV and other PV facilities in the area, the decrease in land capability for livestock is expected to occur, due to construction and operational activities of the PV facility.

	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)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly likely (4)	Highly likely (4)
Significance	**Low (28)**	**Medium (40)**
Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No

Mitigation:
» Keep the footprints of all solar energy facilities as small as possible and to manage the soil quality by avoiding far-reaching soil degradation such as erosion.

Nature: *Cumulative impact areas susceptible to soil erosion.*
During construction Dicoma PV and other PV facilities in the area will be highly vulnerable to soil erosion due to the disturbances that will be created.

	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 or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable 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 Appendix F attached to this EIA.

Nature: *Cumulative impact on areas susceptible to soil compaction.* During construction Dicoma PV and other PV facilities in the area will be highly vulnerable to soil compaction due to heavy machineries on site.		
	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 or negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	No	No
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 Appendix F attached to this EIA.		

Nature: *Cumulative impact on increased risk of soil pollution* During construction Dicoma PV and other PV facilities in the area will be vulnerable to soil pollution due to activities such as spills from fuel storage tanks, pollution from concreate mixing and spills from vehicles transporting workers and construction equipment.		
	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 or 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 Appendix F attached to this EIA.		

8.5 Cumulative Impacts on Heritage (including archaeology and palaeontology)

From a heritage perspective the landscape surrounding Lichtenburg has not been identified as having any special tangible or intangible heritage significance. Therefore, it is unlikely that the proposed Dicoma PV project will result in unacceptable risk, unacceptable loss, whole-scale changes to the sense of place or unacceptable increase in impact.

The heritage cumulative impacts associated with Dicoma PV will be of a low significance.

Nature: *Cumulative heritage impacts* Cumulative impact to the sense of place due to the development of the PV facility which will intensify industrial development within the area.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (1)	Low (1)
Duration	Medium-term (3)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Low (27)**
Status (positive or negative)	Neutral	Neutral
Reversibility	High	Low
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	N/A	
Mitigation: No mitigation required.		

8.6 Cumulative Visual Impacts

A visibility analysis of the PV facilities (i.e. Dicoma PV and other PV facilities) was undertaken individually from each of the proposed sites from a representative number of vantage points per development footprint at 4m above ground level. The results of these analyses were merged in order to calculate the combined visual exposure. The result of the combined visual exposure is indicated in hues of yellow to red, where the darker areas indicate a higher number of PV facilities visible, and the lighter areas represent lower levels of cumulative exposure (**Figure 8.2**).

The more exposed areas are generally located on terrain that is slightly more elevated than its surrounds, or closer to the theoretical centre point of the PV facility footprints. Cumulative visual exposure from the formerly mentioned elevated areas occurs at varying distances from the sites, with some sites appearing in the foreground, whilst others are further away in the distance.

It is preferable to concentrate future solar energy infrastructure within this solar hub/node, considering the fact that there are already approved PV facilities and they are all in relative close proximity to an existing grid connection point (i.e. the Watershed Substation). This will largely help to prevent the scattered proliferation of PV facility structures throughout the greater region.

The anticipated cumulative visual impact is expected to be of moderate significance, which is considered to be acceptable from a visual perspective. This is due to the relatively low viewer incidence within close proximity to the proposed development sites and the presence of the existing electricity infrastructure and mining activities (at Bakerville, Grasfontein and north of Lichtenburg) within the region[30].

Nature: *Potential cumulative visual impact on the visual quality of the landscape* The potential cumulative visual impact of the PV facilities on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local/ very short distance (4)	Regional/ medium to longer distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Probable (3)
Significance	**Moderate (48)**	**Moderate (42)**
Status (positive 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.	
Mitigation: Planning: » Retain/re-establish and maintain natural vegetation 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.		

[30] Regional = medium to longer distance due to the projects being located within a 5.7km radius of each other.

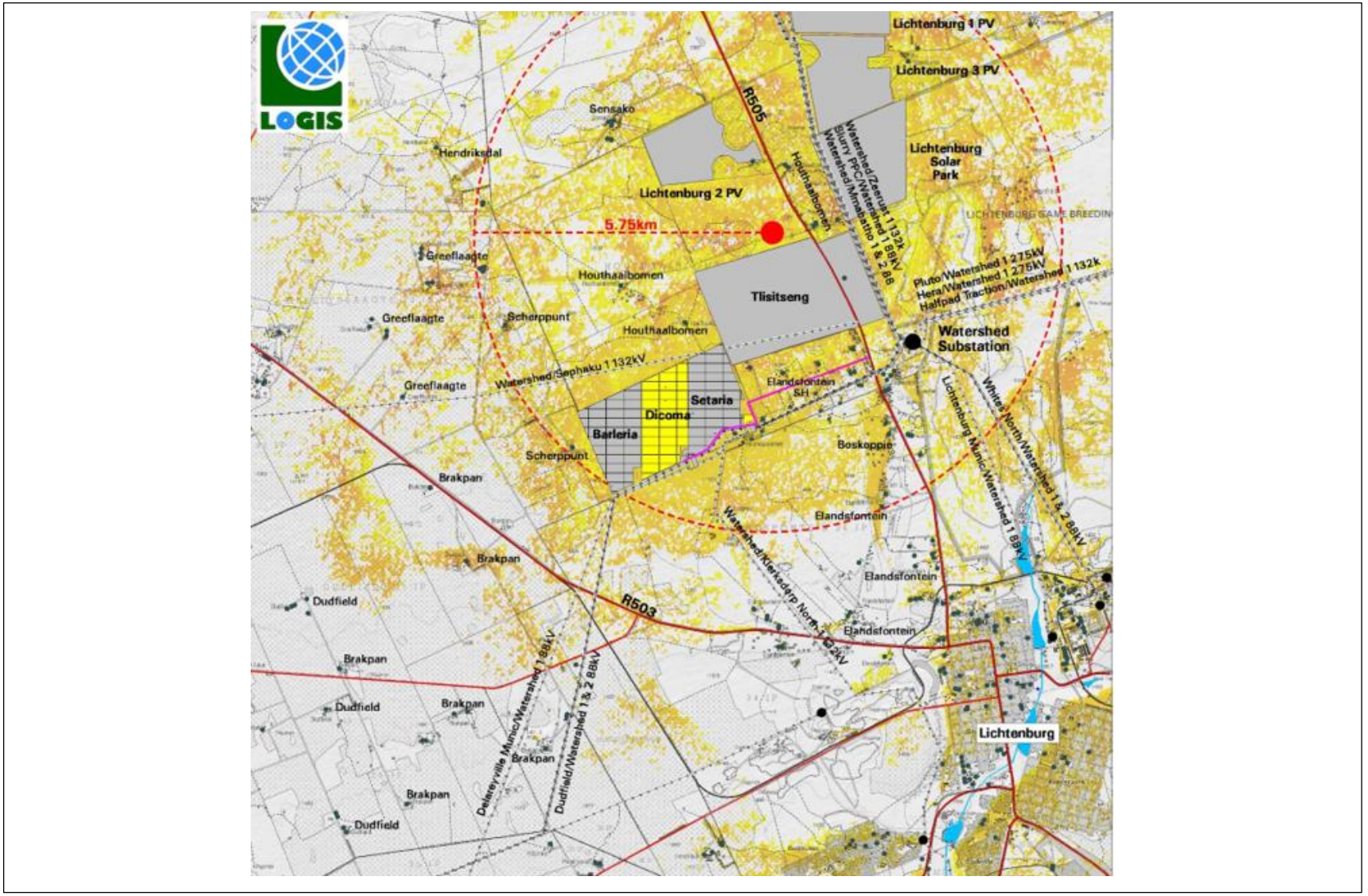


Figure 8.2: Cumulative visual exposure/viewshed analysis for Dicoma PV and surrounding projects. The result of the combined visual exposure is indicated in hues of yellow to red, where the darker areas indicate a higher number of PV facilities visible, and the lighter areas represent lower levels of cumulative exposure

8.7 Cumulative Social Impacts

The potential for cumulative impacts to occur as a result of the projects is therefore likely. Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as an influx of jobseeker and change in the area's sense of place

Dicoma PV Facility and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Dicoma PV Facility alone.

While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living. It is very difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

The social impacts associated with the impact on sense of place relate to the change in the landscape character and visual impact of Dicoma PV Facility. Given the location of the project on a private property, within an area characterised as a mining area, the visual impact and impact on the area's sense of place associated with the project is anticipated to be of a low significance. The alteration of the sense of place in view of the local residents (specifically adjacent landowners) and road users will start during the construction phase and remain for the project's operational lifetime. The area has been exposed to large scale industrial development.

The development of various PV facilities within the area will increase the extent of industrial infrastructure and result in a low significance from a social perspective.

Nature: *Cumulative impacts of employment opportunities, business opportunities and skills development* During the construction and operation phase the establishment of a number of solar power projects under the REIPPP Programme in the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities		
	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	Moderate (6)	Moderate (6)
Probability	Probable (3)	Highly Probable (4)
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 enhanced?	Yes	
Enhancement measures: » lif 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: *Cumulative impact with large-scale in-migration of people* 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	Short-term (2)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Very Improbable (3)	Probable (3)
Significance	**Low (7)**	**Medium (39)**
Status (positive or negative)	Negative	Positive
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Develop a recruitment policy / process (to be implemented by contractors), which will source labour locally. » Work together with government agencies to ensure 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.		

Nature: Visual impact and impact on the 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	Positive
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practice measures can be implemented	
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.		

8.8 Cumulative Traffic Impacts

Cumulative impacts associated with Dicoma PV from a traffic perspective has been assessed. The cumulative impact and significance of the development of other proposed PV facilities in the vicinity are considered low negative and medium positive. It is unlikely that the other projects will be constructed within the exact same period as the Dicoma PV.

Nature: Cumulative traffic impacts Traffic will be negatively impacted, during the construction phase of the solar energy facilities and related infrastructure.		
	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	Short term (1)	Short term (1)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (12)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impacts be mitigated?	Yes	
Mitigation: » N/A		

8.9 Conclusion regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development of Dicoma PV 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 Dicoma PV is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

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

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes) due to the development of the Dicoma PV Facility and other renewable energy facilities within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of the Dicoma PV Facility and other renewable energy projects within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- There will be no unacceptable loss of land capability due to the development of the Dicoma PV Facility and other renewable energy projects within the surrounding areas, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- Change to the sense of place and character of the area is expected with the development of renewable energy facilities. However, the change is not considered to be a fatal flaw.
- There will be no unacceptable loss of heritage resources associated with the development of the Dicoma PV Facility and other wind farms within the surrounding areas. The cumulative impact is therefore acceptable.

- No unacceptable socio-economic impacts are expected to occur. The cumulative impact is therefore acceptable.
- No unacceptable impacts to the traffic network are expected to occur with the development of the Dicoma PV Facility and other renewable energy projects within the surrounding areas. The cumulative impact is therefore acceptable.

A summary of the cumulative impacts is included in **Table 8.2** below.

Table 8.2: Summary of the cumulative impact significance for Dicoma PV

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Ecology	Low	Low
Avifauna	Low to Medium (depending on the impact being considered)	Low, Medium to High (depending on the impact being considered)
Land use, soil and agricultural potential	Low	Low to Medium (depending on the impact being considered)
Heritage (archaeology and palaeontology)	Low	Low
Visual	Medium	Medium
Socio-Economic	Low to Medium (depending on the impact being considered)	Medium
Traffic	Low	

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

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

Dicoma PV (Pty) Ltd is proposing the construction of a photovoltaic (PV) solar energy facility (known as Dicoma PV) located on a site approximately 5km north-west of the town of Lichtenburg in the North West Province. The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 75MW. The facility will be located within the farm Portion 1, Portion 9, Portion 10 of the Farm Houthaalboomen 31. The project site falls under the Ditsobotla Local Municipality which is part of Ngaka Modiri Molema District Municipality. The site is accessible via an existing gravel road (provincial road D2435) which tees-off from the R505 regional road.

A development area of 179ha has been identified within the broader project site by the proponent for the development of Dicoma PV and associated infrastructure, which has been fully considered within this Scoping/EIA process, and assessed in terms of its suitability from an environmental and social perspective within this EIA Report.

Site-specific studies and assessments have delineated areas of potential sensitivity within the identified project site. The development area is regarded as being of a appropriate extent to provide opportunity for the avoidance of major environmental sensitivities where identified. Dicoma PV will have a contracted capacity of up to 75MW and will include specific infrastructure, namely:

» PV modules and mounting structures
» Inverters and transformers
» BESS, Construction and O&M hub:
  - Battery Energy Storage System (BESS)
  - Temporary and permanent laydown area
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage
» Site and internal access roads (up to 8m wide)
» Grid connection solution within a 100m wide corridor[31], including:
  - 33kV cabling between the project components and the facility substation
  - A 132kV facility substation
  - A 132kV Eskom switching station
  - A Loop-in-Loop out (LILO) overhead 132kV power line between the Eskom switching station and the existing Delareyville Munic–Watershed 1 88kV power line[32].

From a regional perspective, the Lichtenburg area is considered favourable for the development of a commercial solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the extent of the affected property, the availability of a grid connection (i.e. a point of connection to the national grid) and the availability of land on which the development can take place.

Dicoma PV is planned to be bid into the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme with the aim of evacuating the

[31] Two Alternative grid connection corridors have been assessed as part of this EIA.

[32] The LILO corridor intersects with several existing parallel Eskom power lines (Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above-mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply with Dicoma PV Energy PV set to inject up to 75MW into the national grid.

As the project has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction and operation of Dicoma PV.

9.1 Legal Requirements as per the EIA Regulations, 2014 (as amended). For the undertaking of an EIA 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(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 Dicoma PV Energy facility has been included in section 9.2
3(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	An environmental impact statement containing the key findings of the environmental impacts of Dicoma PV facility has been included as section 9.5. Sensitive environmental features located within the study area and development area, overlain with the proposed development footprint have been identified and are shown in Figure 9.1.
3(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether the Dicoma PV facility should be authorised has been included in section 9.6.
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation of the Dicoma PV facility have been included in section 9.7.

9.2 Evaluation of Dicoma PV facility

The preceding chapters of this report together with the specialist studies contained within **Appendices D-J** provide a detailed assessment of the potential impacts that may result from the development of proposed Dicoma PV facility. This chapter concludes the environmental assessment of Dicoma PV facility and associated infrastructure by providing a summary of the results and conclusions of the assessment of the development area. 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 were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of no-go features (i.e. 10m heritage no-go areas) within the project development area by the development footprint and the undertaking of monitoring, as specified by the specialists.

The potential environmental impacts associated with Dicoma PV facility identified and assessed through the EIA process include:

- Impacts on ecology, flora and fauna.
- Impacts on avifauna.
- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology and palaeontology.
- Visual impacts on the area imposed by the components of the facility.
- Social impacts.

9.2.1 Impacts on Ecology (including flora and fauna)

The Terrestrial Ecology Assessment (**Appendix D**) undertaken determined that there are no impacts associated with the Dicoma PV facility and associated grid line corridor that cannot be mitigated to an acceptable level and as such, the assessed layout was considered acceptable. It was found that the bulk of project site will be located within a slightly degraded to near-natural savanna grassland type characterized by *Searsia pyroides*. Furthermore, about a quarter of the project site is located within a secondary grassland. To the north and north-east the vegetation comprises of a mostly natural savanna grassland type characterized by *Senegalia hereroensis*. Both of savanna/wooded grasslands are variations of the Carletonville Dolomite Grassland vegetation type which is listed as Least Threatened.

Almost the entire development footprint (gird and PV Solar) is located within an ESA1 (Corridor/Linkage). Due to the large extent of this ESA1 (90% of the development footprint), and the availability of ample natural to near natural areas still available the development will not have a significant impact on this ESA, and its ability to function as an important corridor.

A section of the eastern portion of the project site is located within an ESA1 (Corridor/Linkage). Due to the large extent of this ESA1, and the availability of ample natural to near natural areas still available the development will not have a significant impact on this ESA, and its ability to function as an important corridor.

Overall, there are no specific long-term impacts likely to be associated with the development of the Dicoma PV project that cannot be reduced to a low significance. Both grid connection corridor alternatives are also considered to be acceptable. As such, there are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding.

9.2.2 Impacts on Avifauna

The Avifauna Impact Assessment (Appendix E), which considered the results of two seasons of pre-construction bird monitoring, determined the significance of potential avifauna impact to be moderate to low after mitigation (depending on the type of impact), with the exception of the potential for birds to collide with the associated power lines, which was high without mitigation (and moderate after mitigation). The study site is not located near any prominent wetland system or impoundment, and therefore the risk of waterbird collisions with the proposed infrastructure was considered to be low. However, in the absence of sufficient information on the occurrence and rate of passing waterbirds, it was recommended that supporting evidence be acquired by means of peak wet season before construction (pre-construction surveys).

The endangered Cape Vulture (*Gyps coprotheres*) and critically endangered White-backed Vulture (*Gyps africanus*) (and to a lesser degree also Lappet-faced Vulture *Torgos tracheliotos*) were identified as regular

foraging visitors to the study site (according to SABAP2 reporting rates and on-site observations). These species are highly prone to power line collisions, whereby the proposed energy facility (especially the proposed overhead power lines) could pose a collision and electrocution risk to vultures. The risk of collision/electrocution was considered likely when vultures feed on a carcass in close proximity to a power line or when attempting to roost on the pylon structures.

No fatal flaws were identified during the assessment of the PV Facility. Impacts related to avian collision and electrocution with overhead power lines between LILO alternative 1 and 2 were also considered to not be a fatal flaw regardless of the alternative route. Nevertheless, it is recommended by the specialist that the proposed mitigation measures and monitoring protocols (additional with pre- and post-construction monitoring) be implemented during the construction and operational phase of the project.

» *9.2.3 Impacts on Soil and Agricultural Potential*

The soil forms present within the development area consist mostly of shallow soils underlain by lithic material or rock that has severe limitations to rainfed crop production. The current agricultural land use is livestock farming and the land has never been used for rainfed or irrigated crop production. There is also no irrigation infrastructure, such as centre pivots or drip irrigation, present within the project area. Considering the soil properties, land capability and agricultural potential of the development area, the entire area has Low Agricultural Sensitivity.

It is anticipated that the construction and operation of the Dicoma PV facility and associated infrastructure 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. Both grid connection corridor alternatives are also considered to be acceptable. It is therefore the specialist's opinion that the proposed development is 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 project area that will be fenced off.

» *9.2.4 Impacts on Heritage Resources (archaeological and paleontological)*

A stone structure was identified within the development area. It is likely that this is a burial site (LCTB013/LICBUR6). This site is graded IIIA and a no-development buffer of 10m is recommended around this site.[33] The impact rating was determined to be of low significance with mitigation, where required.

Based on the experience of the palaeontologist and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the loose sands of the Quaternary. No fossils were seen during the site survey and there were no rocky outcrops at all.

The heritage specialists have no objection to the proposed development of the Dicoma PV facility on condition that the 10m no-go buffer be implemented, a management plan is developed for the ongoing and long-term management of the burials within the development area, and a Chance Fossil Finds Procedure be implemented for the duration of the construction phase of the project. From a heritage and paleontological perspective, both grid connection alternatives are considered acceptable.

[33] The development footprint assessed in this EIA Report has considered the 10m heritage site buffer, and have excluded these buffer areas from the PV facility layout.

» 9.2.5 *Visual Impacts*

The anticipated visual impacts associated with the construction and operation phases of the Dicoma PV Facility and associated infrastructure range from moderate to low significance. These anticipated visual impacts on sensitive visual receptors, if and where present, in close proximity to the proposed facility (Scherppunt, Houthaalbomen 1 and 2 , the western residences within the Elandsfontein agricultural holdings, and observers travelling along the R503 arterial road south of the facility) are not considered to be fatal flaws.

In the specialist's opinion, considering all factors, it is recommended that the development of the facility as proposed be supported; subject to the implementation of the recommended mitigation measures and management programme. Grid connection corridor Alternative 1 is 2.2km long, while the Alternative 2 is less than 1km. The shorter of the two corridors is preferred due to the reduced length and reduced visual exposure. Alternative 2 will also remove the substation and switching station further away from the Elandsfontein small holdings and placing it in closer proximity to the other PV facility infrastructure.

» 9.2.6 *Social Impacts*

The social impacts identified (including all positive and negative impacts) will be either of a low or medium significance. No negative impacts with a high significance rating have been identified to be associated with the development of the Dicoma PV Facility and associated infrastructure. All negative social impacts are within acceptable limits with no impacts considered as unacceptable from a social perspective. The recommendations proposed for the project are appropriate and suitable for the mitigation of the negative impacts and the enhancement of the positive impacts. Dicoma PV Facility and its associated grid connection is supported at a national, provincial, and local level, and that the proposed project will contribute positively towards a number of targets and policy aims.

Based on the findings of the SIA the proposed establishment of the Dicoma PV is supported.

» 9.2.7 *Traffic Impacts*

The impact of the construction trip generation, on the predicted 2023 traffic volumes near the town of Lichtenburg and along the transportation routes, are expected to be low. No mitigation measures (upgrading of existing intersections) will be necessary. The direct impact and significance of the Dicoma PV Facility is considered low negative and low positive for the traffic and community parameters, respectively. it is the reasoned opinion of the specialist that Dicoma PV Facility can be authorised from a traffic perspective.

» 9.2.8 *Assessment of Cumulative Impacts*

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa and within the surrounding areas of the development area. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional, and national level have the potential to be significant.

Based on the specialist cumulative assessment and findings (**Appendix D** to **Appendix J** and Chapter 8 of the EIA), the development of Dicoma PV and its contribution to the overall impact of all existing and proposed solar energy facilities within a 30km radius, it can be concluded that cumulative impacts will be of a low to high significance, with impacts of a high significance mainly relating to impacts on avifauna. There are however no impacts or risks identified to be considered as unacceptable with the development of Dicoma PV and other solar energy facilities within the surrounding area. In addition, no impacts which will result in whole-scale change are expected.

9.3 Environmental Sensitivity Mapping

As part of the specialist investigations undertaken within the project development area, which includes the development area, specific environmental features and areas were identified which will be impacted by the placement of Dicoma PV facility. The current condition of the features identified (i.e. intact or disturbed) will inform the sensitivity of the environmental features and its capacity for disturbance and change associated with the proposed development.

The environmental features identified within and directly adjacent to the project site and development footprint are illustrated in **Figure 9.2**. The sensitive features identified and indicated on the sensitivity map to be avoided/buffered only relate heritage resources. The following points provide a description of the sensitivities identified within the project site:

» **Ecological features:**

- Low Medium Ecological Sensitivity:

  From a terrestrial ecological perspective, it was found that the bulk of project site is located within secondary grassland.

- Medium Ecological Sensitivity:

  Portions of primary grassland and a section of the eastern portion of the project site is located within an ESA1 (Corridor/Linkage). Due to the large extent of this ESA1, and the availability of ample natural to near natural areas still available the development will not have a significant impact on this ESA, and its ability to function as an important corridor.

No high sensitive features and "No-Go" areas were identified within the project area.

There are no areas identified which are required to be excluded from the proposed development footprint.

» **Avifauna:**

Open mixed woodland, artificial livestock watering points and extensive open grassland and bush clump mosaics habitat units comprising of potential sensitive avifauna features have been observed on the project site. The following preliminary avifauna sensitivities have been identified:

» Medium Avifauna Sensitivity:

- Medium sensitivity habitats units include the extensive open grassland and bush clump mosaics.
- Abundance of threatened and near threatened bird species are anticipated to be relatively low, thereby suggesting a medium sensitivity rating instead of a high sensitivity even though the

majority of the habitat is natural. In addition, the open grassland and bush clump mosaics are widespread in the region.

There are no areas identified which are required to be excluded from the proposed development footprint.

» **Soils:**
All of the components associated with the Dicoma PV project area are located on land potential areas of Low sensitivity. No no-go areas have been identified and no buffers have been recommended.

» **Heritage Resources:**
A number of stone structures were identified within the development area. It is likely that a number of these are burial sites (LICBUR1, LICBUR2, LICBUR6, LICBUR10, LI9, LI13 and LI14). These have been graded IIIA and a no-development buffer of 10m is recommended around these sites.

» **Visual:**
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. The facility would be visible within an area that incorporates certain sensitive visual receptors who would consider visual exposure to this type of infrastructure to be intrusive. Such visual receptors include people travelling along roads (R505, R503, and provincial main roads) and residents of surrounding agricultural holdings. No no-go areas have been identified and no buffers have been recommended.

» **Traffic:**
The proposed main access road to the site is an existing gravel road (D2435) which tees-off from the R505. The access road and the access point to the development is deemed suitable from a traffic engineering perspective. No no-go areas have been identified and no buffers have been recommended.

9.4 Consideration of Alternatives

Two alternative grid connection solutions within a 100m wide corridor were considered as part of this assessment. The grid connection corridor alternatives assessed are as follows:

Grid Connection Alternative 1: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other approximately 1.3km east of the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will connect into the Delareyville Munic–Watershed 1 88kV[34] . The grid connection infrastructure is located within an assessment corridor 100m in width.

Grid Connection Alternative 2: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other and infringes on the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching station will

34 The LILO corridor intersects with several existing parallel Eskom power lines(Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

connect into the Delareyville Munic–Watershed 1 88kV. The grid connection infrastructure is located within an assessment corridor of 100m in width.

As part of specialist assessments both alternative grid connection solutions were assessed, and both alternative corridors were determined to be acceptable from an environmental perspective. A summary of the assessment of impacts for the grid connection corridor and associated infrastructure alternatives are detailed below:

Aspect	Grid Connection Corridor Alternative 1	Grid Connection Corridor Alternative 2
Ecology	*Acceptable*	*Preferred & Acceptable*
Avifauna	*Acceptable*	*Preferred & Acceptable*
Heritage	*Acceptable*	*Acceptable*
Visual	*Acceptable*	*Preferred & Acceptable*

Although Grid Connection Corridor Alternative 2 is the preferred alternative from an ecological, avifauna, and visual perspective, it has been indicated by the respective specialists that all impacts on both grid connection corridor alternatives can be mitigated to acceptable levels and therefore both alternatives are considered to be environmentally acceptable.

Grid Connection Corridor Alternative 1 was identified by the developer as the preferred alternative from a technical feasibility perspective, due to its strategic location allowing it to potentially act as a broader collector switching station for future planned projects. This grid alternative has been fully considered and assessed as part of the Scoping/EIA process and within this EIA report to be acceptable from an environmental perspective. Grid Connection Corridor Alternative 2 is less preferred from the technical perspective due to the location being surrounded by an adjacent PV facility to the west, north and east, and constrained by existing power lines to the south. This infrastructure will inhibit the entry of the high voltage feeder lines into the Eskom collector switching station, which renders the alternative technically less preferred.

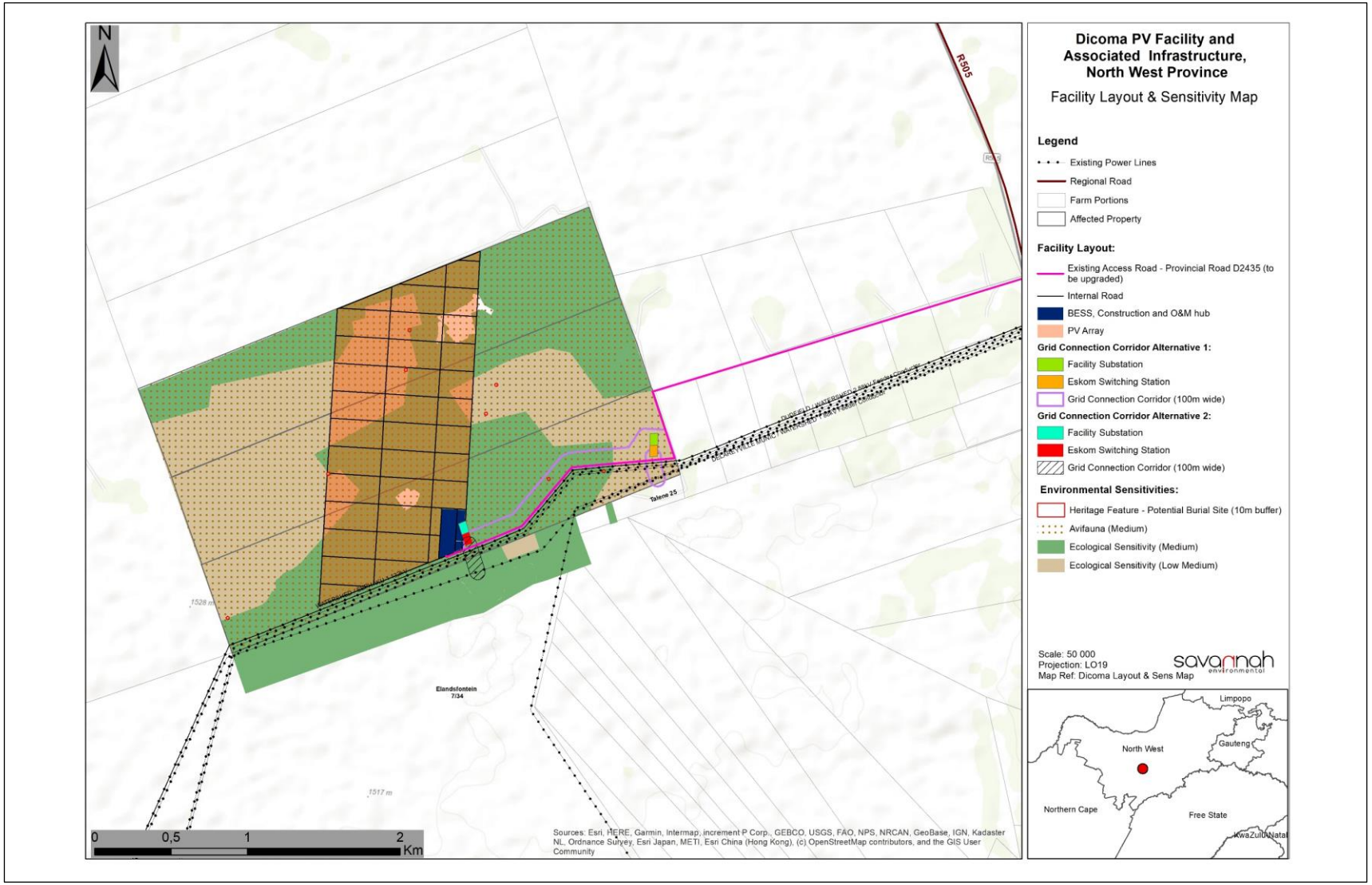


Figure 9.1: Environmental sensitivity map overlain with the assessed grid connection corridor within which the grid connection infrastructure for the Dicoma PV Grid Connection Corridor Alternatives 1 and 2 are proposed to be developed (A3 map is included in Appendix O)

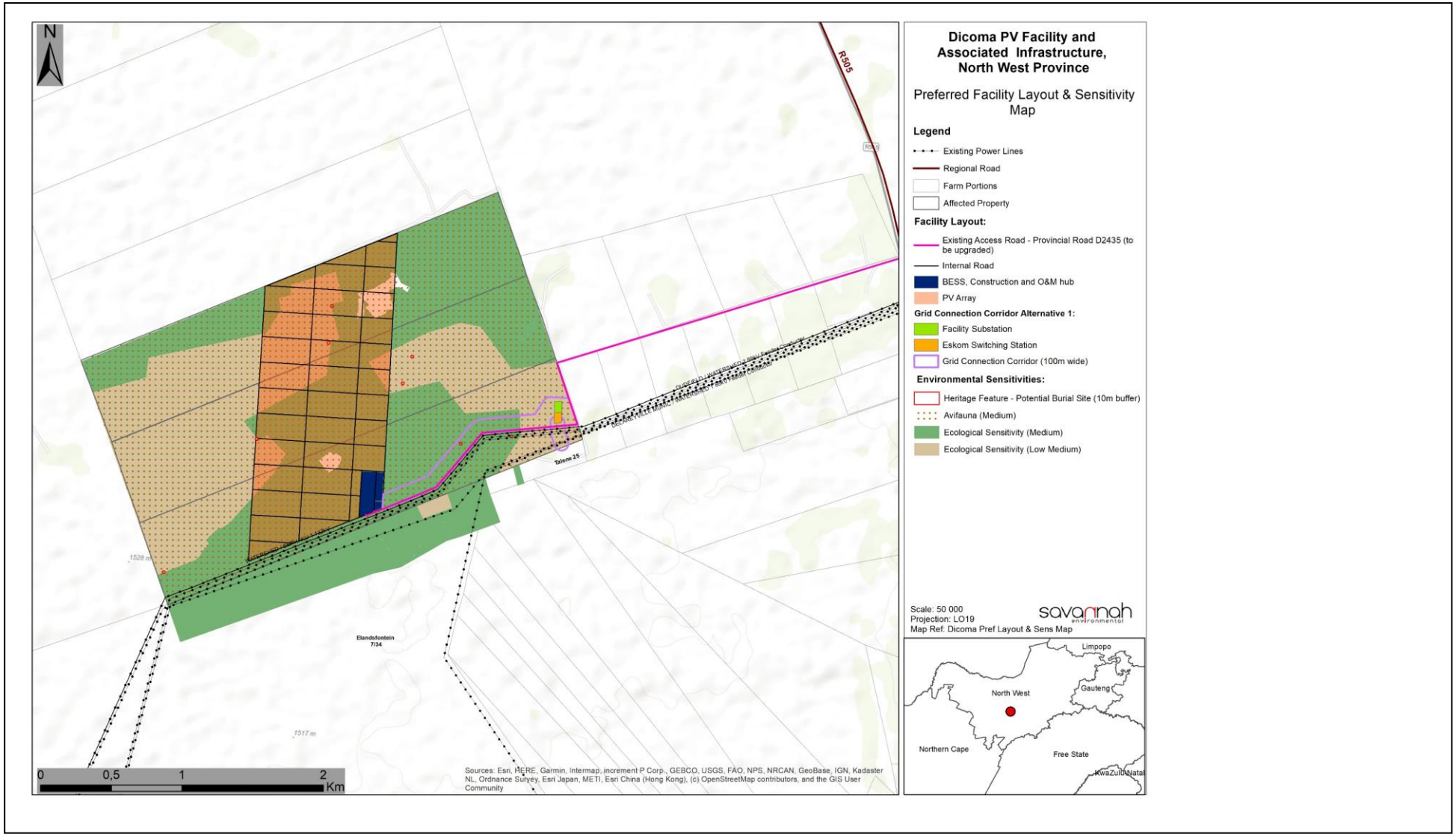


Figure 9.2: Preferred layout and sensitivity map of the preferred development footprint and grid connection corridor for the Dicoma PV Facility, as was assessed as part of the EIA process (A3 map is included in Appendix O).

9.5 Environmental Costs of the Solar PV Facility and its associated grid connection versus Benefits of the Solar PV Facility

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

These environmental costs could include:

- A loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for the PV facility. The cost of loss of biodiversity has been minimised/avoided through the implementation of recommendations provided by the specialist.
- Impacts on birds. The development will result in a loss of habitat. The impact is however considered to be acceptable without any impact of high significance.
- Heritage impacts associated with the PV facility. The Dicoma PV Facility might have an impact on the heritage resources. Mitigation measures that have been recommended will reduce the anticipated impacts.
- Loss of land for agriculture. The development will remove areas available for agricultural activities. However, based on the low sensitivity of the soils within the development footprint of the PV Facility, this will not be significant.
- Visual impacts associated with the PV facility. It is envisaged that the structures where visible from shorter distances, and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence. General mitigations have been recommended to minimise the impact.
- Impacts on the social environment. Socio-economic impacts include impacts on the sense of place and property and business values that could occur during both construction and operation, the effect on social and economic infrastructure, and crime and social conflicts in the area that could be created during only the construction phase. These impacts though will only affect local communities either temporarily or over the long term. These impacts are not highly significant and can be traded off for the net positive impact created by the project in terms of production, employment, government revenue, community benefits and households' earnings.
- An increase in traffic - the construction phase will result in an increase in traffic. This impact will however be short-term in extent and is not considered to be significant.

Benefits of the Dicoma PV 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 preconstruction, construction, operation and decommissioning phases of the project.
- The project provides an opportunity for a new land use on the affected properties which is considered as a more efficient use of the land and provides an opportunity for financial benefits to the current land use.
- 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.
- 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. The Dicoma PV Facility will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of the Dicoma PV Facility are expected to occur at a national, regional, and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the PV facility.

9.6 Overall Conclusion (Impact Statement)

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using solar irradiation as the preferred technology, due to the availability of a suitable solar resource. Independent specialists appointed to undertake the assessment of potential impacts associated with the project assessed a larger area in order to inform the best location for the solar facility infrastructure. 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. A proposed layout was designed after provision of sensitivity data by the specialists with the aim of avoiding sensitive areas identified.

Based on the specialist investigations of the larger area, a technically viable development footprint was proposed by the developer and assessed as part of the EIA process. The findings of the assessment of the development footprint undertaken by independent specialists have informed the results of this report. The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the project within the project site.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and National level. The project development area is located outside of any protected area and outside of any Critical Biodiversity Areas (CBAs) as defined in the Provincial Conservation Plan. When considering biodiversity and socio-economic benefits and impacts on the affected and surrounding areas, the following is concluded from the specialist studies undertaken within this EIA process.

From a biodiversity perspective, the site is not located within a protected area. The site is located within an extensive ESA. However, overall, there are no specific long-term impacts likely to be associated with the development of the Dicoma PV facility that cannot be reduced to a low significance. There are no fatal flaws associated with the development and no terrestrial ecological considerations that should prevent it from proceeding. No sensitivities were identified from an avifauna perspective, and the layout proposed ensures that all heritage sensitivities identified through the EIA process are avoided and recommended buffer areas are honoured. This approach is in line with the application of the mitigation hierarchy, where all the sensitive areas which could be impacted by the development have been avoided (i.e. tier 1 of the mitigation hierarchy). Where impacts could not be avoided, appropriate mitigation has been proposed to minimise impacts. It follows therefore that the project does not adversely impact on the ecological integrity of the area.

The Socio-economic Impact Assessment has identified short-term (construction related) impact indicators and operational related socio-economic impact indicators. The assessment of the proposed facility, and its net

effect from a socio-economic perspective, indicates that the project would generate greater socio-economic benefits during both the construction and operational phases than the potential losses that could occur as a result of its establishment.

As detailed in the cost-benefit analysis, the benefits of the Dicoma PV Facility are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the PV facility. From an economic perspective, both positive and negative impacts are expected.

Based on the conclusions of the specialist studies undertaken, it can be concluded that the development of the Dicoma PV facility based on the current layout as provided by the Applicant will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

9.7 Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer within the development site, the avoidance of the sensitive environmental features within the project site, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the Dicoma PV facility is acceptable within the landscape and can reasonably be authorised. The proposed layout as provided by the Applicant (**Figure 9.2**) is considered to be the most appropriate from an environmental perspective as it avoids identified sensitivities and recommended buffer areas.

The following infrastructure would be included within an authorisation issued for the project:

75MW Solar PV facility: Dicoma PV facility located within farm Portion 1, Portion 9, Portion 10 of the Farm Houthaalboomen 31, including:

» PV modules and mounting structures
» Inverters and transformers
» BESS, Construction and O&M hub:
  - Battery Energy Storage System (BESS)
  - Temporary and permanent laydown area
  - Site offices and maintenance buildings, including workshop areas for maintenance and storage
» Site and internal access roads (up to 8m wide)

Grid Connection Corridor Alternative 1: 33kV cabling will connect the Dicoma PV facility solar array to the 132kV facility substation. The facility substation and Eskom switching station are located directly adjacent to each other approximately 2.2km east of the eastern boundary of the Dicoma PV facility development area, on Portion 1 of the Farm Houthaalboomen 31. A 132kV loop-in-loop out power line from the Eskom switching

station will connect into the Delareyville Munic–Watershed 1 88kV[35] . The key infrastructure for the grid connection described above are as follows:

» Grid connection solution within a 100m wide corridor, including:
  - 33kV cabling between the project components and the facility substation
  - A 132kV facility substation
  - A 132kV Eskom switching station
  - A Loop-in-Loop out (LILO) overhead 132kV power line between the Eskom switching station and the existing Delareyville Munic–Watershed 1 88kV power line.

The following key conditions would be required to be included within an authorisation issued for the Dicoma PV Facility:

» All mitigation measures detailed within this EIA report, as well as the specialist reports contained within **Appendices D to L** are to be implemented.
» The EMPr as contained within **Appendix M** of this EIA report should form part of the contract with the Contractors appointed to construct and maintain the solar facility in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the Dicoma PV Facility is considered key in achieving the appropriate environmental management standards as detailed for this project.
» Following the final design of the Dicoma PV Facility, a revised layout must be submitted to DFFE for review and approval prior to commencing with construction. No development is permitted within the identified no-go areas as detailed in **Figure 9.2.**
» A pre-construction walk-through of the final layout, including roads and underground cables, should be undertaken before construction commences and adjusted where required to reduce impacts on species of conservation concern and habitats of concern.
» A detailed site-specific eradication and management programme for alien invasive plants must be developed and implemented.
» Before construction commences individuals of listed species within the development footprint that would be affected, must be counted and marked and translocated, where deemed necessary by the ecologist conducting the pre-construction walk-through survey. Permits from the relevant national and provincial authorities, must be obtained before the individuals are disturbed.
» Implement a chance finds procedure for the rescuing of any fossils or heritage resources discovered during construction.
» If any archaeological material or human burials are uncovered during construction activities, work in the immediate area should be halted, the find reported to the heritage authorities and inspected by an archaeologist. Such heritage is the property of the State and may require excavation and curation in an approved institution.
» Maintain vegetation cover (i.e. either natural or cultivated) immediately adjacent to the actual development footprint, both during construction and operation of the proposed facility.
» Monitor all rehabilitated areas for one year following decommissioning and implement remedial actions as and when required.

[35] The LILO corridor intersects with several existing parallel Eskom power lines (Watershed-Sephaku 1 132kV, Dudfield–Watershed 2 88kV, Dudfield-Watershed 1 88kV and Watershed-Klerksdorp North 1 132kV). Therefore, should the connection to the Delareyville Munic–Watershed 1 88kV not be technically feasible, connection to the above-mentioned power lines would still be within the assessed LILO corridor and considered feasible through the construction of a shorter LILO connection.

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

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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
8455	HIA Phase 1	Udo Kusel	25/07/2008	Cultural Heritage Resources Impact Assessment of Portion 151 of Lichtenburg Town and Townlands 27 IP (Lichtenburg Extension 10) North West Province
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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