Draft Scoping Report 2022-04-0027

PROPOSED RENEWABLE ENERGY GENERATION PROJECT ON PORTION 10 OF THE FARM LICHTENBURG TOWN AND TOWNLANDS 27 IP, DITSOBOTLA LOCAL MUNICIPALITY, NGAKA MODIRI MOLEMA DISTRICT MUNICIPALITY, NORTH WEST PROVINCE

Short name: LICHTENBURG SOLAR PARK

21 June 2022

Commissioned by: Matrigenix (Pty) Ltd

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Short name: LICHTENBURG SOLAR PARK

21 June 2022

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	Department of Water and Sanitation (DWS)
	Department of Agriculture, Land Reform and Rural Development (DALRRD)
	North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)
	Ngaka Modiri Molema District Municipality
Municipal Manager	Ditsobotla Local Municipality
	South African Heritage Resources Agency (SAHRA)
	Eskom Land & Rights
	Registered Interested and Affected Parties (I&AP's)

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ABBREVIATIONS AND ACRONYMS

AGES	Africa Geo-Environmental Services (Pty) Ltd
BID	Background Information Document
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CSP	Concentrating Solar Power
DALRRD	Department of Agriculture, Land Reform and Rural Development
DFFE	National Department of Forestry, Fisheries and the Environment
DMR	Department of Mineral Resources
DME	Department of Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environment Impact Assessment Report
EMPr	Environmental Management Programme
ESS	Environmental Scoping Study
GHG	Green House Gases
GIS	Geographic Information Systems
GN	Government Notice
GWh	Giga Watt hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
kV	kilovolt
MW	Mega Watt
MWp	Mega Watt peak
NEMA	National Environmental Management Act - Act no. 107 of 1998
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act - Act no. 25 of 1999
NWA	National Water Act - Act no. 36 of 1998
PoS	Plan of Study
Property / Project site	Portion 10 of Lichtenburg Town and Townlands 27 IP (Ditsobotla Local Municipality, Ngaka Modiri Molema District Municipality, North West Province)
PV	Photovoltaic
RFP	Request for Qualification and Proposals for New Generation Capacity under the IPP Procurement Programme
REIPPPP	Renewable Energy IPP Procurement Programme
RMIPPPP	Risk Mitigation IPP Procurement Programme
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
Matrigenix	Matrigenix (Pty) Ltd (Applicant)
UPS	Uninterruptible Power Supply

1. INTRODUCTION

MATRIGENIX (PTY) LTD is applying for Environmental Authorization for the establishment of a **renewable energy generation facility (Photovoltaic Power Plant)** with associated infrastructure and structures on:

- **Portion 10 of the Farm Lichtenburg Town and Townlands 27 IP**

located within the **Ditsobotla Local Municipality, Ngaka Modiri Molema District Municipality, North West Province.**

Site location - Surveyor-general 21-digit site code:

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1	2			3				4								5				

The project site is located ±9 km North of Lichtenburg.

The renewable energy generation facility will be a **Photovoltaic (PV) Power Plant** with a **maximum generation capacity up to 165 MW** at the point of connection (**Export Capacity**).

The name of the facility will be **LICHTENBURG SOLAR PARK.**

The **footprint (fenced area)** of the proposed development is approximately **261 ha in extent**.

Access to the Lichtenburg Solar Park will be from the provincial road R505, which connects Lichtenburg with Ottoshoop.

Lichtenburg Energy Solutions intends to participate with the Lichtenburg Solar Park in the **Renewable Energy Independent Power Producer Procurement Programme (REIPPPP**), launched by the **Department of Mineral Resources and Energy** ("DMRE").

In order to develop the facility, Matrigenix (Pty) Ltd must undertake an Environmental Impact Assessment (EIA) process and acquire environmental authorization from the *National Department of Forestry, Fisheries and the Environment (DFFE)*, in consultation with the *North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)*, in terms of the EIA Regulations, 2014 published on 4 December 2014, as amended under section 24(5) and 44 of the National Environmental Management Act (NEMA, Act No. 107 of 1998).

Matrigenix (Pty) Ltd is the applicant for the Lichtenburg Solar Park (the proposed project) which will be connected to the Eskom **Watershed Substation (MTS)** which is located approximately 3km south of the project site.

The independent Environmental Assessment Practitioners (EAP's) which have been appointed for the undertaking of the detailed environmental studies in compliance with the 2014 EIA Regulations as amended, are **AGES Limpopo (Pty) Ltd** (AGES).

With the aim of identifying and assessing all potential environmental impacts related to the development as well as suggesting possible mitigation measures and alternatives, AGES has appointed specialist sub-consultants to compile detailed reports and to study the activities necessary for the assessment of the specific impacts related to their field of expertise.

AGES and the other specialist consultants are in a position of independency from Matrigenix (Pty) Ltd and not subsidiaries or affiliated to the latter. AGES and the specialist consultants have no secondary interest connected with the development of this project or of other projects which may originate from the authorization of the project.

The characteristics, the technology and the extent of the Lichtenburg Solar Park is defined and evaluated in this Scoping Report and its annexures.

2. MOTIVATION AND RATIONALE OF THE LICHTENBURG SOLAR PARK IN LIGHT OF THE RENEWABLE ENERGY IPP PROCURMENT PROGRAMME REQUIREMENTS

2.1. THE CHOICE OF THE NORTH WEST PROVINCE AND OF THE SITE LOCATION

The Lichtenburg Solar Park will be located near the city of Lichtenburg, in the North West Province. During the previous Rounds of the REIPP Procurement Programme, very few projects have been selected by the Department of Energy (now Department of Mineral Resources and Energy) in the North West Province. Therefore, the macro-area where the project is planned never received the benefits - in terms of socio-economic development and local contents- arising from the previous Rounds of the REIPP Procurement Programme.

The North West Province and in particular the Ditsobotla Local Municipality has been identified by Matrigenix as an ideal area for establishing a solar PV plant based on the following considerations:

- there are few green projects currently operating in the North West Province and it is clear that the "green energy quota" can be achieved mainly by means of solar projects, considering the high solar resources and the availability of lands with low ecological and agricultural value; and
- available Eskom grid capacity
- other infrastructure nearby to develop a renewable energy project.

In addition to these favourable conditions in terms of desirability of a renewable solar energy projects in the North West Province, the site of the Lichtenburg Solar Park has been chosen on the basis of several elements:

- the chosen site is also suitable for the installation of a photovoltaic (PV) power plant due to its appropriate morphologically (flat terrain) and regarding the favourable radiation conditions;
- the available radiation allows a high rate of electric energy production, as a combination of latitude-longitude and climatic conditions;
- the low to medium ecological sensitivity of the proposed project site (old fields, degraded / modified land) and
- available Eskom grid connectivity.

2.2. NEED AND DESIRABILITY OF THE PROJECT

South Africa's electricity supply still heavily relies upon coal power plants, whereas the current number of renewable energy power plants is still limited. In the last few years, the demand for electricity in South Africa has been growing at a steady rate.

These factors, if coupled with the rapid advancement in community development, have determined the growing consciousness of the significance of environmental impacts, climate change and the need for sustainable development. The use of renewable energy technologies is a sustainable way in which to meet future energy requirements.

In the **IRP 2019**, issued by the Department of Energy (now **Department of Mineral Resources and Energy (DMRE)**) under Notice No. 1360 dated 18 October 2019 in *Government Gazette* 42784, in accordance with the Electricity Regulation Act, 2006 (Act No. 4 of 2006) provision was made to procure an additional **6 000 MW** of solar PV and 14 400 MW of wind between **2022** and **2030**.

The purpose of the proposed Lichtenburg Solar Photovoltaic Plant is to add new capacity for the generation of renewable electric energy to the national electricity supply in compliance with the Renewable Energy IPP Procurement Programme (REIPPPP) and in order to meet the "sustainable growth" of the North West Province.

The use of solar radiation for power generation is considered a non-consumptive use and a renewable natural resource which does not produce greenhouse gas emissions. The generation of renewable energy will contribute to the growth of South Africa's electricity market, which has been primarily dominated up to this date by coal-based power generation. With specific reference to photovoltaic energy, and the proposed project, it is important to consider that South Africa has one of the highest levels of solar radiation in the world.

The proposed solar park will assist the Eskom grid to meet the high energy demand related to the farming and hospitality activities conducted outside of Lichtenburg. The purpose of the proposed **Lichtenburg Solar Park** is to add new capacity for the generation of electrical energy to the national electricity supply, in compliance with the Minister of Energy's Determinations and in order to meet the "electricity consumptions' growth" of the North West Province.

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The reasons for the location of the project in the selected area are as follows:

- low requirement for municipal services;
- compliance with national and provincial energy policies and strategies;
- no impact on people health and wellbeing;
- no waste and noise;
- no impact on air quality;
- compatibility with the ecosystem and the surrounding landscape;
- likelihood of social and economic development of marginalized, rural communities; and

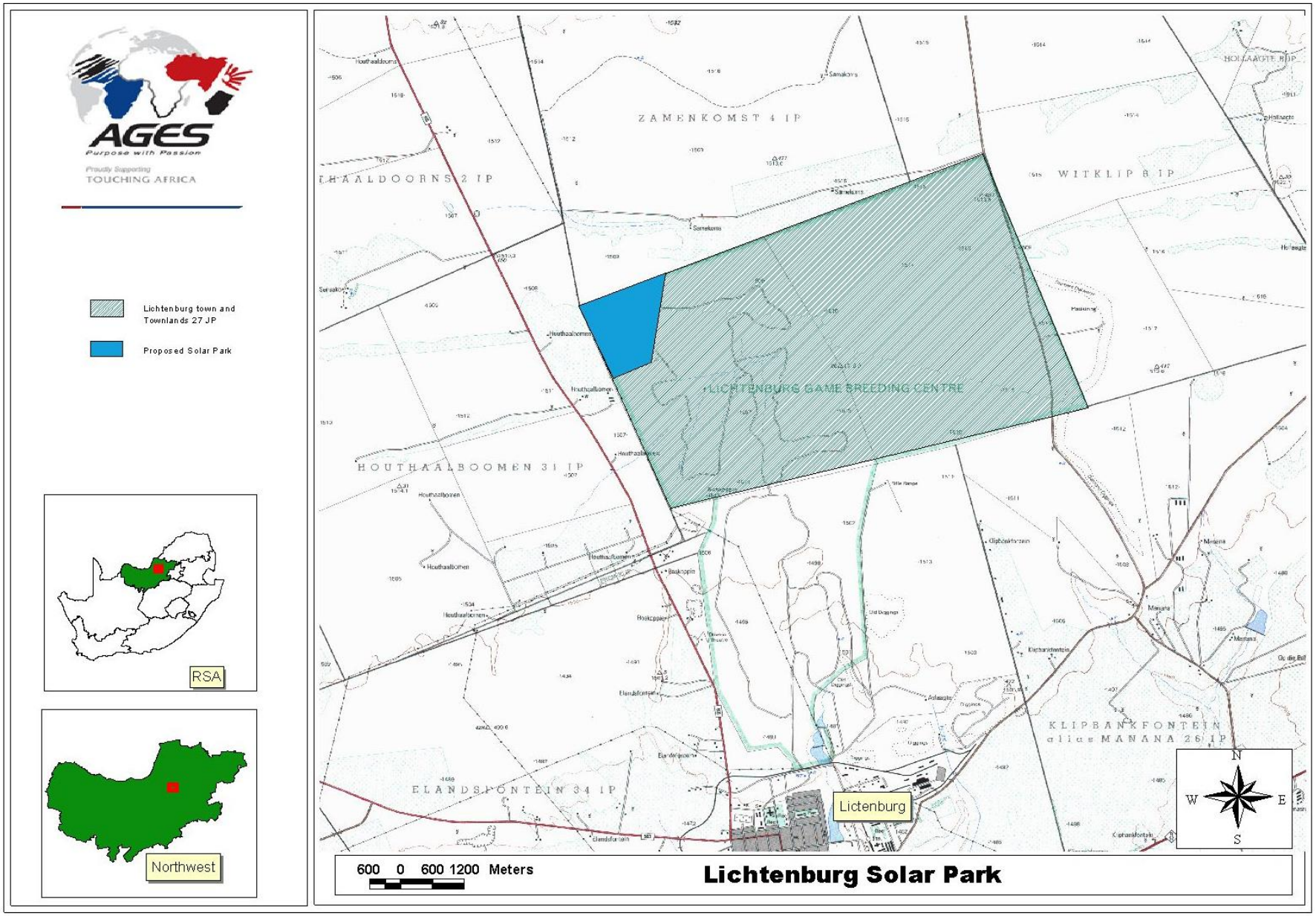

Figure 1. Locality map

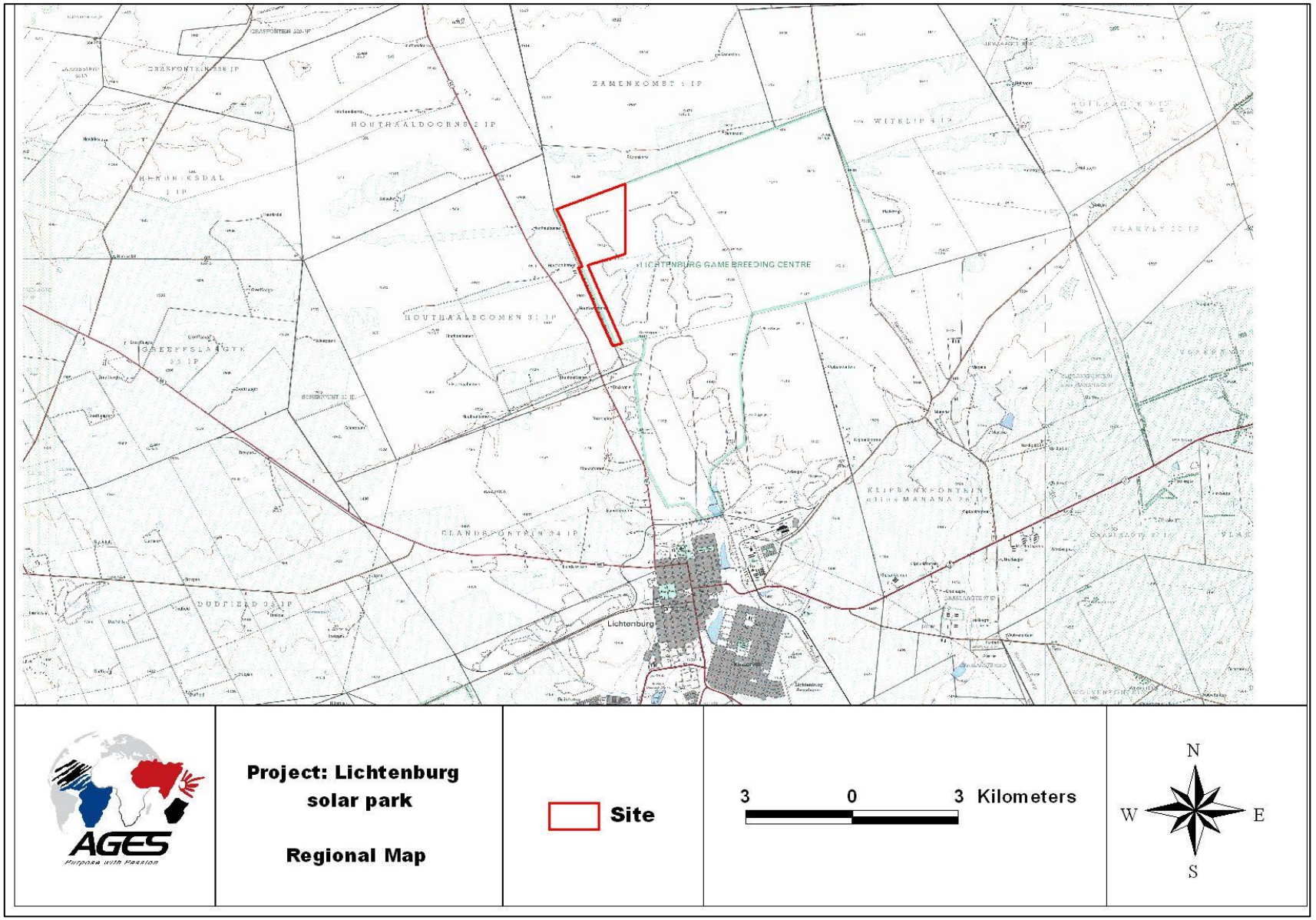

Figure 2. Topographical map

3. AUTHORITIES, LEGAL CONTEXT AND ADMINISTRATIVE REQUIREMENTS

The legislative and regulatory framework of reference for the solar power plant project includes statutory and non-statutory instruments by which National, Provincial and Local authorities exercise control throughout the development of the same project.

The development and the environmental assessment process of a solar power plant project involve various authorities dealing with the different issues related to the project (economic, social, cultural, biophysical etc.).

3.1. REGULATORY AUTHORITIES

3.1.1. National Authorities

At national level, the main regulatory authorities and agencies are:

- *Department of Mineral Resources and Energy (DMRE):* This Department is the competent and responsible authority for all policies related to energy, including renewable energy. Solar energy is contemplated and disciplined under the White Paper for Renewable Energy and the Department constantly conducts research activities in this respect.
- *National Department of Forestry, Fisheries and the Environment (DFFE):* This Department is the competent and responsible authority for all environmental policies and is the controlling authority under the terms of NEMA and EIA Regulations. The DFFE is also the competent authority for the proposed project and is entrusted with granting the relevant environmental authorisation.
- *National Energy Regulator of South Africa (NERSA):* The Regulator is competent and responsible for regulating all aspects dealing with the electricity sector and issues the licence for independent power producers.
- *South African Heritage Resources Agency (SAHRA):* This Agency is responsible for the protection and the survey, in association with provincial authorities of listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes under the terms of the National Heritages Resources Act (Act no. 25 of 1999).
- *South African National Roads Agency Limited (SANRAL):* This Agency is responsible for all National Road routes.

3.1.2. Provincial Authorities

At provincial level, the main regulatory authority is the *North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT);* this Department is responsible for environmental policies and is the Provincial authority in terms of NEMA and the EIA Regulations and is also the commenting authority for the proposed project.

3.1.3. Local Authorities

At a local level, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the North West Province, Municipalities and District Municipalities are involved in various aspects of planning and the environment related to solar energy facilities development. The Local Municipality is the *Ditsobotla Local Municipality* which is part of the *Ngaka Modiri Molema District Municipality*.

Local authorities also provide specific by-laws and policies to protect visual and aesthetic resources with reference to urban edge lines, scenic drives, special areas, signage, communication masts etc.

Finally, there are also various non-statutory bodies and environmental groups, who are involved in the definition of various aspects of planning and the protection of the environment, which may influence in the development of the proposed project.

3.2. LEGISLATION, REGULATIONS AND GUIDELINES

A review of the relevant legislation involved in the proposed development is detailed in table 1 below.

Table 1. Review of relevant legislation

National Legislation	Sections applicable to the proposed project
Constitution of the Republic of South Africa (Act no. 108 of 1996)	• Bill of Rights (S2) • Rights to freedom of movement and residence (S22) • Environmental Rights (S24) • Property Rights (S25) • Access to information (S32) • Right to just administrative action (S33)
Fencing Act (Act no. 31 of 1963)	• Notice in respect of erection of a boundary fence (S7) • Clearing bush for boundary fencing (S17) • Access to land for purpose of boundary fencing (S18)
Conservation of Agricultural Resources Act (Act no. 43 of 1983)	• Prohibition of the spreading of weeds (S5) • Classification of categories of weeds & invader plants and restrictions in terms of where these species may occur (Regulation 15 of GN R0148) • Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R0148)
Environment Conservation Act (Act no. 73 of 1989)	• National Noise Control Regulations (GN R154 dated 10 January 1992)
National Water Act (Act no. 36 of 1998)	• Entrustment of the National Government to the protection of water resources (S3) • Entitlement to use water (S4) - Schedule 1 provides the purposes which entitle a person to use water (reasonable domestic use, domestic gardening, animal watering, fire-fighting and recreational use) • Duty of Care to prevent and remedy the effects of water pollution (S19) • Procedures to be followed in the event of an emergency incident which may impact on water resources (S20) • Definition of water use (S21) • Requirements for registration of water use (S26 and S34) • Definition of offences in terms of the Act (S151)
National Forests Act (Act no. 84 of 1998)	• Protected trees

National Environmental Management Act (Act no. 107 of 1998)	• Definition of National environmental principles: strategic environmental management goals and objectives of government applicable in SA to the actions of all organs of state, which may significantly affect the environment. • **NEMA EIA Regulations 2014 (GN R. 982, 983, 984, 985 of 4 December 2014) as amended** • Requirement for potential impact on the environment of listed activities to be considered, investigated, assessed and reported on to the competent authority (S24 - Environmental Authorisations). • Duty of Care (S28): requirement that all reasonable measures are taken in order to prevent pollution or degradation from occurring, continuing and recurring, or, where this is not possible, to minimise and rectify pollution or degradation of the environment. • Procedures to be followed in the event of an emergency incident which may impact on the environment (S30).
National Heritage Resources Act (Act no. 25 of 1999)	• SAHRA, in consultation with the Minister and the MEC of every province must establish a system of grading places and objects which form part of the national estate (S7) • Provision for protection of all archaeological objects, paleontological sites and material and meteorites entrusted to provincial heritage resources authority (S35) • Provision for the conservation and care of cemeteries and graves by SAHRA, where this is not responsibility of any other authority (S36) • List of activities which require notification from the developer to the responsible heritage resources authority, with details regarding location, nature, extent of the proposed development (S38) • Requirement for compilation of a Conservation Management Plan and permit from SAHRA for presentation of archaeological sites for promotion of tourism (S44)
National Environmental Management: Biodiversity Act (Act no. 10 of 2004)	• Provision for the MEC for Environmental Affairs/Minister to publish a list of threatened ecosystems and in need of protection (S52) • Provision for the MEC for Environmental Affairs/Minister to identify any process or activity which may threaten a listed ecosystem (S53) Provision for the Member of the Executive Council for Environmental Affairs/Minister to publish a list of: critical endangered species, endangered species, vulnerable species and protected species (S56(1) - see Government Gazette 29657 • Three government notices have been published up to date: GN R150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R151 (Lists of critically endangered, vulnerable and protected species) and GN R152 (Threatened Protected Species Regulations)

National Environmental Management: Air Quality Act (Act no. 39 of 2004)	• Provision for measures in respect of dust control (S32) • Provision for measures to control noise (S34)
National Environmental Management: Waste Management Act (Act no. 59 of 2008)	• Waste management measures • Regulations and schedules • Listed activities which require a waste licence
Occupational Health and Safety Act (Act No. 85 of 1993)	• Health and safety of all involved before and after construction must be protected.

Guideline Documents	Sections applicable to the proposed project
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA no. 107 of 1998	• Impact of noise emanating from a proposed development may have on occupants of surrounding land by determining the rating level • Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	• The Guidelines outline rules and conditions related to transport of abnormal loads and vehicles on public roads and detailed procedures to be followed for the grant of exemption permits

Policies and White Papers	Sections applicable to the proposed project
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	• The White Paper supports investment in renewable energy initiatives, such as the proposed solar power plant project
The White Paper on Renewable Energy (November 2003)	• The White Paper outlines the Government's vision, policy, principles, strategic goals and objectives for the promotion and the implementation of renewable energy in South Africa
Integrated Resource Plan (IRP1) Integrated Resources Plan 2010-2030 (IRP 2010). Update of the Integrated Resources Plan 2010-2030 (IRP 2019)	• The first Integrated Resource Plan (IRP1) was released late 2009. Subsequently the DoE decided to undertake a detailed process to determine South Africa's 20-year electricity plan, the Integrated Resources Plan 2010-2030 (IRP 2010). • The IRP1. IRP 2010 and IRP 2019 outline the Government's vision, policy and strategy in matter of the use of energy resources and the current status of energy policies in South Africa. • In the **IRP 2019**, published in October 2019, provision has been made to procure an additional **6 000 MW** of solar PV and 14 400 MW of wind between **2022** and **2030**.
Renewable Energy IPP Procurement Programme (REIPPPP)	• Renewable Energy IPP Procurement Programme, issued on 3 August 2011 by DoE.
Equator Principles (July 2006)	• The Equator Principles provide that future developments with total project capital costs of US$10 million or more shall be financed only if socially and environmentally sustainable

3.3. LISTED ACTIVITIES IN TERMS OF NEMA

The "listed activities" in terms of sections 24 and 24D of NEMA, included in **Listing Notices 1, 2 & 3 of the EIA Regulations, 2014, as amended,** involved in the proposed development, are detailed in table 2 below.

Table 2. Listed Activities in terms of EIA Regulations 2014 triggered by the proposed development

GN R.983 Item 11 (i) The development of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	Alternative Connection 1: On-site 132 kV substation, located outside urban areas or industrial complexes will be connected via a new 132 kV power line, ±3.4 km long, to Watershed Substation, south of the development site. Alternative 2: 132kV powerline, 1.6 km long, up to future (planned) switching station of the Lichtenburg 1, 2 and 3 PV projects, proposed by another developer on Ptn 2 of Zamenkomst 4 IP.
GN R.983, Item 12 The development of (xii) infrastructure or structures with a physical footprint of 100m² or more; (c)within 32m of a watercourse, measured from the edge of a watercourse,	The access road from the south towards Lichtenburg Solar Park will cross a drainage line / watercourse and the new proposed powerline to the Eskom Watershed MTS will also cross the drainage line and will be 32m from the edge of the water course.
GN R.983, Item 24 (ii) The development of - (ii) a road with a reserve wider than 13,5m, or where no reserve exists where the road is wider than 8m	During construction phase, access road will have a reserve wider than 13.5 m to allow the transportation of abnormal goods (*e.g.* power transformers, *etc.*).
GN R.984 Item 1 The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 MW or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.	The project will consist of construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a Maximum Export Capacity up to 165 MW with associated infrastructure and structures, to be partially located outside an urban area.
GN R.984 Item 15 The clearance of an area of 20 ha or more of indigenous vegetation	The PV Power Plant with associated infrastructure and structures will be constructed and operated on a footprint of approximately 261ha. The required footprint should be cleared from the existing vegetation.

The listed activities applied for may be revised during the EIA phase, once all the outcomes of the specialist studies will be available and the potential impacts are fully assessed and if this is the case a new application form will be submitted with the EIA Report.

There are layout and site plans in draft format (Annexure A) which will be finalized once inputs from all specialists and via public participation have been received, analysed and reviewed. All information acquired will be analysed in order to determine the proposed final development layout and site plans. Such approach will ensure a holistic view of future requirements of the site and that resources are utilised to their full availability in terms of social and environmental sustainability. This application and all other development applications, in the area, are considered together in order to ensure general sustainability in the Local and District Municipal areas.

4. PROJECT DESCRIPTION AND FUNCTIONING

The project envisages the establishment of a solar power plant with a maximum generation capacity at the delivery point (Maximum Export Capacity) of up to 165 MW.

The construction timeframe is estimated to be between 8 and 12 months.

The preferred technical solutions envisage:

- **mono/polycrystalline PV modules, mono or bi-facial.**
- **fixed mounting systems** or **horizontal 1-axis trackers.**

The energy generated by the Lichtenburg Solar Park will reduce the quantity of pollutants and greenhouse gases emitted into the atmosphere. The reduced amount of CO_2 will be the emissions that would have been generated by a thermal power plant using fossil fuels for producing the same quantity of energy that it is produced by the Lichtenburg Solar Park.

The detailed description of the characteristic and functioning of the PV plant and its connection is given in the following paragraphs.

4.1. PROJECT LAYOUT

The layout of the proposed development is the result of an extensive comparative study of various layout alternatives and had been defined in consideration of the results of some specialist studies conducted during this scoping phase.

The PV plant is designed and conceived in order to minimize visual and noise impacts, as well as to operate safely and assuring a high level of reliability, with low water consumption and the need only for easy and quick maintenance and repair for approximately 30 years.

The footprint (fenced area) of the Lichtenburg Solar Park will be up to 261 ha.

The main drives of the proposed layout are:

- to maximize the energy production and the reliability of the PV plant, by choosing proven solar technologies; mono or bi-facial mono/polycrystalline solar modules mounted on single-axis horizontal trackers (SAT) or on fixed mounting systems.
- to develop the PV power plant in the southern section of the farm, avoiding high potential agricultural land and natural areas.
- to avoid the Critical Biodiversity Areas (CBAs).

The proposed layout plan (attached as Annexure A and also shown in Figure 3 below) was drawn using PV modules mounted on trackers. In the case of PV modules mounted on fixed mounting systems, the layout plans will not change, except for the orientation of the PV arrays: East-West instead of North-South. The site layout plan included in Annexure A is more detailed.

The required footprint - corresponding on the fenced area - will be up to 261 ha, and the maximum height of the structures (PV modules and support frames) will be approximately 4.5 m above the ground level.

The location of the planned footprint will be further assessed (and amended - if required) in the Environmental Impact Assessment Reports. All inputs and comments arising from the Public Participation Process will be considered as well as inputs from specialist and specialist reports.

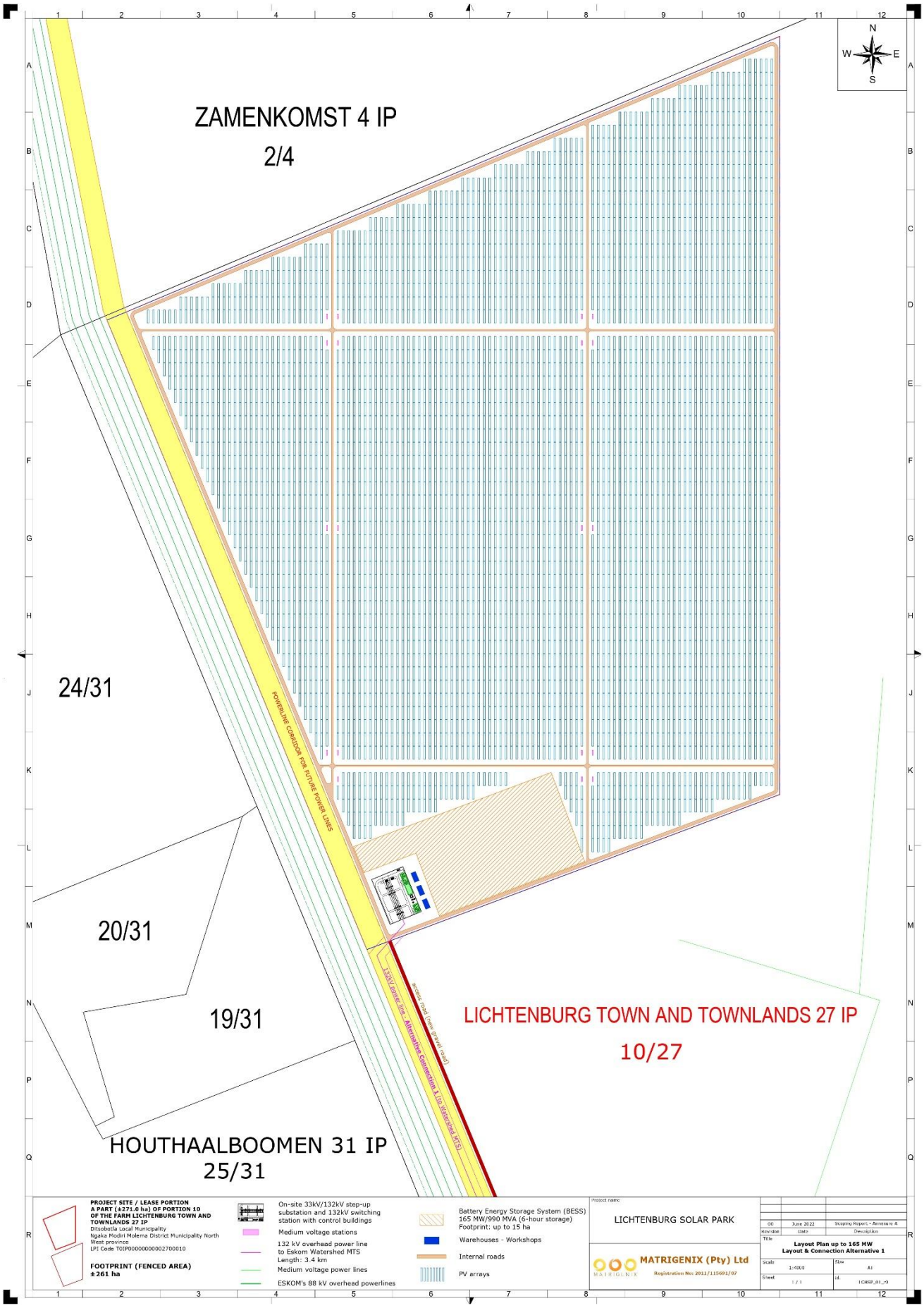

Figure 3. Proposed Draft Layout Plan of the Lichtenburg Solar Park – Alternative 1

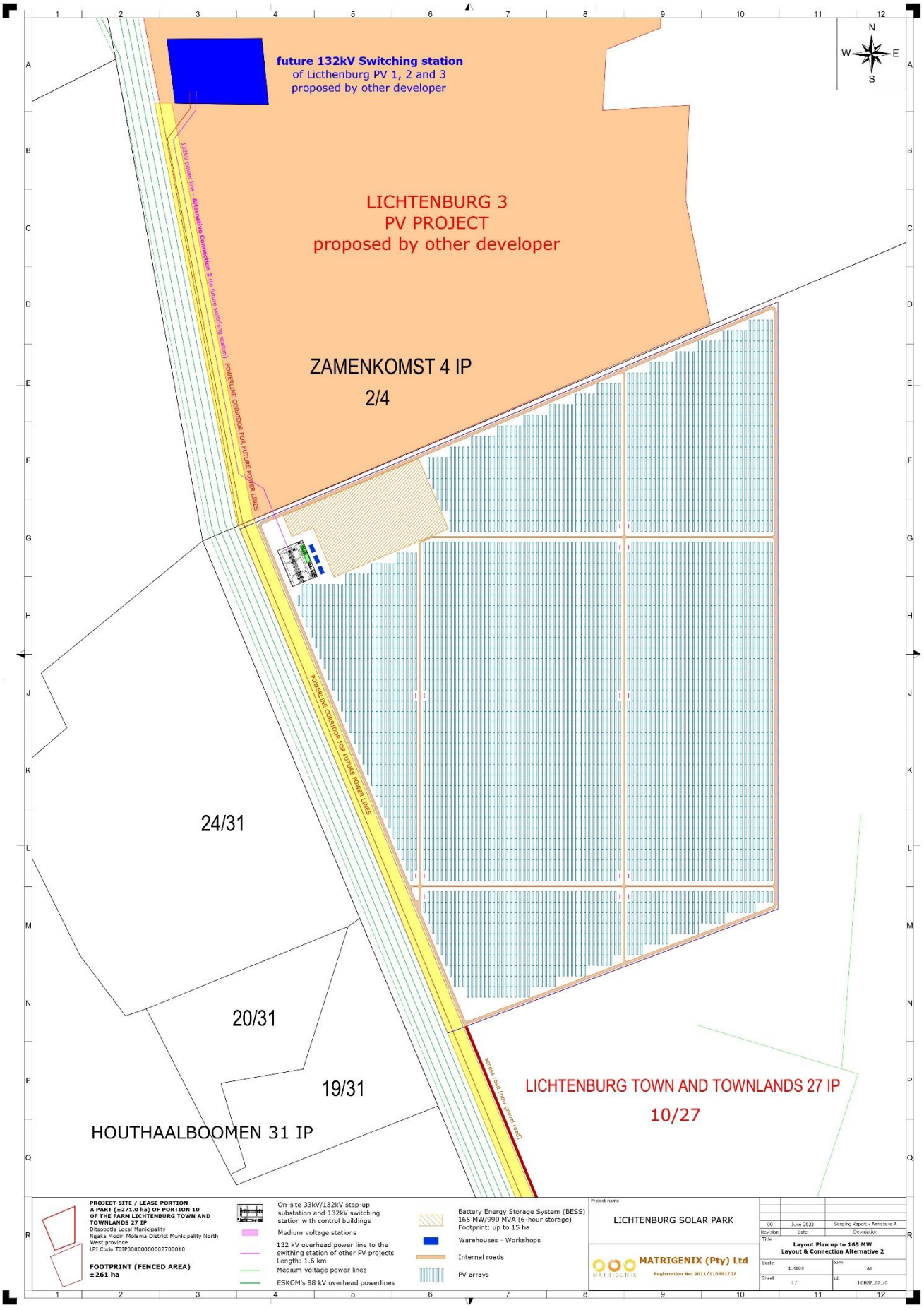

Figure 4. Proposed Draft Layout Plan of the Lichtenburg Solar Park – Alternative 2

4.2. PRIMARY COMPONENTS

The proposed development (the Photovoltaic (PV) Power Plant and its connection infrastructure) consists of the installation of the following equipment:

- Photovoltaic modules (mono-crystalline, poly-crystalline, mono or bi-facial modules)
- Mounting systems for the PV arrays (single-axis horizontal trackers or fixed structures) and related foundations
- Internal cabling and string boxes
- Medium voltage stations, hosting DC/AC inverters and LV/MV power transformers
- Medium voltage receiving station(s)
- Workshops & warehouses
- One on-site high-voltage substation with high-voltage power transformers, stepping up voltage, and one high-voltage busbar with metering and a switching station
- One 132 kV power line, approximately 3.4 km long, connecting the on-site switching station to the busbar of the **Watershed Substation.** Or
- One 132 kV powerline, approximately 1.6 km going north to a planned switching station as proposed by another developer.
- **Battery Energy Storage System (BESS)**.
- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- Internal roads
- Fencing of the site and alarm and video-surveillance system
- Water access point, water supply pipelines, water treatment facilities
- Patented Sewage system

The connection alternatives will be a 132kV powerline with monopole structures up to 18m in height, positioned 200m between each pole, with a 30m servitude.

4.2.1. Project functioning

Solar energy facilities using PV technology convert sun energy to generate electricity through a process known as the Photovoltaic Effect, which consists of the generation of electrons by photons of sunlight in order to create electrical energy.

The preferred technical solutions are:

- Mono / bi-facial mono / polycrystalline modules, mounted on:
- fixed mounting systems or mounted on horizontal 1-axis trackers,

which at present represent the best performing options in terms of reliability and costs/efficiency.

The PV technology is in constant and rapid evolution, this means that the final choice of the type of solar modules (mono-crystalline or polycrystalline, mono or bi-facial) and mounting system (fixed or tracker) can be taken at the time of the commission date, on the basis of the availability of PV modules and mounting systems, of the worldwide market and of the cost-efficiency curve.

The required footprint - corresponding to the fenced area - will not exceed 261 ha, and the maximum height of structures (PV modules and support frames) will be approximately 4.5 m above ground level.
PV modules will be assembled on zinced steel or aluminium frames, to form PV arrays. The metal frames that sustain PV arrays are set to the ground by fixed support poles.

A) In the case of PV modules mounted on fixed mounting systems:

Each mounting frame will host several PV modules along two or more parallel rows consisting of PV modules placed side by side, with the position of the PV arrays northwards and at an optimized tilt. The rows are mounted one on top of the other, with an overall mounting structure height up to 4.5 meters above ground level.

B) In the case of PV modules mounted on trackers:

Each PV array is composed of several PV modules disposed along one or more parallel rows consisting of PV modules placed side by side.
Each tracker is composed by several PV arrays North-South oriented and linked by an horizontal axis, driven by a motor. The horizontal axis allows the rotation of the PV arrays toward the West and East direction, in order to follow the daily sun path.
The maximum mounting structure height will be up to 4.5 meters above ground level.

C) In both cases:

PV modules are series-connected outlining PV strings made of several modules, so that the PV string voltage fits into the voltage range of the inverters. PV strings are set up in order to be connected to DC-connection boxes. Each String Box allows the parallel connection of several PV strings (also called "PV sub-field").

String Boxes monitor the currents in photovoltaic modules and can promptly diagnose faults. String boxes are also designed with a circuit breaker in order to disconnect the photovoltaic sub-fields from the inverters. The PV sub-fields are thought to be linked to central inverters, located in medium voltage stations. Each station comprises prefabricate buildings designed to host DC/AC inverters and a medium voltage power transformer. The DC/AC inverters are deemed to convert direct current (DC) into alternate current (AC) at low voltage; subsequently the AC will pass through a medium-voltage transformer in order to increase the voltage up to 132 kV.

The energy delivered from the medium voltage stations will be collected into one (or more) medium voltage receiving station(s), parallel connecting all the PV fields of the PV generator.

From the medium voltage receiving station, the energy will be delivered to two high-voltage power transformers (250 MVA, plus one as spare), which will step up the electric energy from the medium voltage level (132 kV) to the required connecting voltage. The power transformers will be connected to an on-site 132 kV busbar (the so called "switching station"), to be equipped with protection and metering devices.

The new on-site HV substation will need to be equipped with circuit breakers upstream and downstream, in order to disconnect the PV power plant and/or the power line in case of failure or grid problems. **Lichtenburg Solar Park** will be connected either to the 132 kV busbar of the **Eskom Watershed Main Transmission Substation (MTS)** via a new 132 kV power line up to 3.4 km long or a 132 kV powerline up to 1.6 km to the north on another development site.

The power generation capacity at delivery point (Maximum Export Capacity) will be up to 165 MW.

4.2.2. Battery Energy Storage System (BESS)

A Battery Energy Storage System (BESS), 165 MW/990 MVA with 6-hour storage capacity will be installed next to the on-site step-up substation and switching station, within the footprint and fenced area of the Lichtenburg Solar Park.

Two alternative sites have been identified for the BESS and substation and switching station. All three components are grouped together with control buildings. Alternative 1 is located in the south western corner of the development site and Alternative 2 is located in the north west corner of the proposed development site.

The lithium-ion batteries will store energy at times of low energy demand and release the energy to the grid at times of pick demand. The battery energy storage system can also provide other grid services (if required by Eskom) aimed to improve grid stability and power quality, by turning on and off in fractions of a second, such as "Fast Frequency Response" (FFR).

The Battery Storage Facility will have a footprint of up to 15 hectares and will comprise of the following equipment:

- Containers, on a concrete platform, will house the batteries, management system and auxiliaries.
- Transformer stations.
- Additional area is required for the container for cooling units.
- Internal access roads up to 8.0m wide between rows of containers. Where required, internal access roads will be constructed.
- BESS will be connected:
  - to the PV plant by means of DC/DC inverters, and
  - to the bus-bay of the on-site step-up substation by means of kiosk transformers, medium-voltage overhead lines and/or underground cables;

The batteries to be installed in the containers will be of the Lithium-ion type and the battery cells will be pre-assembled at the supplier factory prior to delivery to the site. NO electrolytes will be transported to and handled on site.

The Battery System shall be able to store electrical energy and charge and discharge electrical energy when connected to a Power Conversion Unit (PCU), which performs the current conversion from LV DC to MV AC (and vice versa). The battery is commonly connected at AC MV level to the Renewable Power Plant for HV conversion and grid interconnection.

Battery Storage in combination to solar power plants is capable to provide multiple services to the plant and to the power transmission network adding flexibility to the system. Possible applications include amongst others: renewable generation time shifting, unbalancing reduction, curtailment avoidance, frequency regulation, voltage support, spinning reserve.

4.2.3. Access road and internal roads

Access to the Lichtenburg Solar Park will be from the regional road R505, which runs along the Western corner of the project site.

Internal roads will consist of gravel roads designed in accordance with engineering standards. The roads will have a width of 4.0 meters allowing for the slow-moving heavy vehicles.
During construction phase, access roads will have a road reserve wider than 13.5 m (up to 16.0 m) to allow the transportation of abnormal goods (*e.g.* power transformers, *etc.*).
During operation, access roads will be up to 8 m wide with a road reserve up to 13.5 m
Once the solar park is in operation, the internal roads will mainly be used for maintenance and inspections. The vertical alignment of the roads will not present significant challenges due to the flatness of the terrain. The entire development will be contained inside a fenced area and the roads are not intended for public use.

4.2.4. Lighting system

The lighting system will consist of the following equipment:

- Floodlight-towers: maximum 10 m high, with directional lamps (LED type) of 120 W, installed around the HV loop-in loop-out substation. Normal lighting: 15 lux; up to 40 lux in case of emergency.
- Street lighting along internal roads, for the stretch from the access point up to the HV substation inside the property: 1 streetlamp, maximum 5.5 m high, every 20 m, having a LED lamp of 120 W.
- 2x120 W spotlights (LED type) mounted on the top of medium-voltage stations.

The lighting of the MV stations and of the on-site HV substation will be on only in case of intrusion/emergency or necessity to reach the MV stations / HV substation during the night.
During the night, the video-surveillance system will use infra-red (or micro-wave) video-cameras, which do not need a lighting system (which could reduce the functioning).

4.2.5. Stormwater collection system

Given the low rainfall, flat topography and low flow speed of run-off, no formal storm water structures are required as the proposed gravel roads will be developed at ground level so as not to disturb the natural flow of storm water. This means that run-off will not be concentrated, and existing drainage patterns will be left undisturbed. Despite this, a storm water management plan will be compiled by qualified hydrologists to minimise any potential negative impacts as a result of storm water events.

4.2.6. Water requirements

4.2.6.1. Water requirements during the construction phase

The construction phase will last approximately 12 months.

A) Construction of internal gravel roads

- Water is necessary for the construction of internal gravel roads, to get the gravel compacted to optimum moisture content (OMC).

B) Workers

- Approximately 100 people are estimated to be employed during the construction period, although this number can increase to 150 during peak periods. This number can be higher if the construction period is shortened significantly and more labour is required to shorten the construction period.
- It is estimated that each worker needs 50 liters / 8 working hours for sanitary use.
- Water consumption will be:
    - 100 people x 50 l/person x 264 working days = 1 320 m^3 over 12 months

C) Concrete production

- Concrete is necessary for the basements of the medium-voltage stations, the high-voltage loop-in loop-out substation, the control building, the warehouse and workshop, the basement of the Battery Energy Storage System (BESS) and for the foundations of the mounting systems. The overall amount of concrete to be produced will be *approximately* 15 000 m^3
- 200 litres of water are needed for 1 cubic meter of concrete.

D) Vehicle cleaning

As mitigation measure, the cleaning of vehicles like excavators, mechanical diggers and pile rammers will be done once or twice per month and not during working days, also in order to not increase the water requirement during the construction activities. In order not to waste a large amount of water, high pressure cleaners will be used. Overall, the water requirement for cleaning activity is very low.
Storage tanks will be sized in order to provide a reserve of water approximately **200m^3**.

4.2.6.2. Water requirements during the operational phase

During operation, water is only required for the operational team on site (sanitary use), as well as limited cleaning of solar panels. Further water consumption may be only for routine washing of vehicles and other similar uses.

A) Water for sanitary use

Approximately 35/40 people will be employed during the operation phase of the PV power plant, which will have a lifetime of approximately 25-30 years.

Lichtenburg Solar Park will be in operation 7 days per week; therefore, personnel will operate in shifts. The surveillance team will be present during daytime, night-time and weekends. The average number of people working on site will be of 14 people daytime and 6 people at night. The average daily water consumption for sanitary use is estimated to be 150 litres/day/person for 20 people (14 people daytime and 6 people at night). The daily water consumption will be approximately 3000 litres/day.

B) Water consumption to clean the PV modules

The cleaning activities of the solar panels will be limited to only twice per year. It is assumed that up to 1.0 litre per m^2 of PV panel surface will be needed. Therefore, the amount of water for cleaning is up to 850 m^3 per cleaning cycle and thus 1 700 m^3/year. PV modules cleaning activity can last less than 1 month. If the cleaning activity lasts approximately 2 weeks (12 working days), the daily water consumption will be approximately **71,000 liters/day**, **over 12 days**.

Conclusion

The daily water requirement will be approximately **3,000 liters/day** over 12 months for sanitary use (i.e. **90,000 l/month** and **1,095 m^3/year**).

The water consumption will increase up to **74,000 liters/day** during the cleaning of the solar modules (71,000 liters/day for cleaning activity and 3,000 for sanitary use), which will last less than a month and will occur twice per year during the dry period. PV modules are conceived as self-cleaning with the rain.

It is further proposed that **90,000 l** of water will be stored in **storage tanks** for fire, emergency and washing of panels twice a year.

4.2.6.3. Water provision during construction and operation

Water needs for the construction phase (11 500 m^3 over approximately 12 months) and the operational phase (2 795 m^3/year) can be obtained from the Ditsobotla Local Municipality and/or from on-site boreholes. The Ditsobotla Local Municipality will be consulted in this respect.

4.2.7. Sewerage

Considering that the proposed development will not include formal residential properties there is no need to connect to the municipal sewer reticulation system. Sewer reticulation will be handled by a suitable patented and commercially available wastewater treatment system, which will be a closed system. The sewer system will consist of an installation to serve the offices of the control building. The system will be installed in line with the requirements of the manufacturer. Typical systems consist of a conservancy tank (built underground on site), and a patented digester. Most systems require electricity to power the pumps and fans used in aeration process, although some systems use wind power (whirlybird). The system could require chlorine tablets available commercially. The effluent from the wastewater treatment system will be suitable for irrigation of lawns, or re-use as water for the flushing of toilets, or for fire-fighting purposes. This could reduce the overall water requirement of the development substantially.

More detail on the type of system and possible impacts on the environment will be included in the EIR.

Once the project has been awarded Preferred Bidder Status and it is confirmed that the project is going to proceed, a Water Use License Application will be submitted to the Department of Water and Sanitation for water uses in terms of the National Water Act, 1998 (Act No. 36 of 1998).

4.2.8. Refuse removal

During the construction phase, solid waste will mainly consist of vegetation material as a result of the clearance of vegetation. Other type of solid waste will include, amongst others, wood from packaging, boxboards, expanded polystyrene and household waste. Vegetation material from clearing activity can be recycled to be re-used as organic fertilizer. Other solid wastes will be recycled as much as possible. Non-recyclable waste will be delivered to the closest legal landfill site. The proposed development site is relatively close to the city of Lichtenburg and household waste can be taken to the municipal landfill site, regularly.

During the operational phase (±30 years), solid waste will mainly consist of household waste from the operational team. Other type of solid waste will come from the maintenance activity in case of failure of some components. At the end of the project lifetime, the PV plant will be decommissioned. Silicon of the PV modules and cables (copper and/or aluminium conductor) will be recycled, as well as the aluminium (or zinced steel) frames and piles of the mounting systems. Lichtenburg Energy will enter into an agreement with the Ditsobotla Local Municipality for the PV plant's refuse at the nearby municipal refuse site. No refuse will be buried or incinerated on site. Measures to manage waste will be included in the Draft EMPr, to be submitted with the Draft and Final EIA Reports.

4.3. TEMPORARY CONSTRUCTION CAMP

The construction camp (approximately 10ha) will be located within the planned development area, close to the new on-site substation. Consequently, the construction site area will be gradually reduced at the completion of the last PV fields, and at the end of the works the construction area will be converted into the last PV arrays.

The optimal location of the construction site is important during the planning phase in order to minimize impacts on the surrounding environment. The site's location has been dictated by the nature of the works to be undertaken, specialist studies, site restrictions, town planning intended uses and access.

The area identified for the construction site had to meet the following requirements:

- sufficient size;
- proximity to existing roads;
- availability of water and energy;
- low environmental and landscape value;
- sufficient distance from residential areas; and
- proximity to the worksite.

In addition, to ensure environmental compatibility, the following factors have been considered:

- restrictions on land use (landscape, archaeological, natural, hydrological, etc.);
- terrain morphology;
- presence of high environmental value areas (e.g. wetlands); and
- sand & stone supply.

The establishment of the construction site will be divided into four phases. Steps included here do not follow a time sequence but considered overlapping and simultaneous events.

4.3.1. Phase I

The area will be fenced to prevent intrusion of animals and to protect against materials theft within the site. A video surveillance system will be provided.

4.3.2. Phase II

During the fencing operation as described in Phase I, trees with a conservation value, will be removed and placed temporarily in a safe location for future planting at the end of work. This procedure is required for environmental mitigation. The other tree species will be cut down and transferred to facilities for wood processing.

4.3.3. Phase III

At completion of the works defined in Phases I and II, the following step will be the site clearing and the construction of internal roads. The internal road network should ensure a two-way traffic of heavy goods vehicles in order to minimize trips. The road system is planned for a width of 8 meters. Roads will be of dry and compacted materials. The facility will require constant access control, a weigh-house for heavy trucks, removable structures for the storage of yard tools and temporary storage areas. During Phase III, the installation of MV/LV transformers connected to the Eskom grid is also planned, as well as the laying of underground electrical cables.

4.3.4. Phase IV

Temporary storage areas of materials and workshops will be constructed and used for:

- temporary storage of photovoltaic modules;
- temporary storage for frames and piles of the mounting systems of the PV arrays;

- storage and processing of building material for construction (sand, gravel, concrete batching and mixing plant, steel, etc.).
- drinking water storage for human consumption;
- worker care facilities and site management buildings,
- prefabricated housing modules for workers who may require accommodation inside the site
- technical cabins and management offices;
- medical care unit in a prefabricated module, to allow immediate first aid and emergencies;
- recreation area and canteen (prefabricated modules);
- parking lots for employees, for visiting staff, and trucks and work vehicles during inactivity;
- workshop and storage facilities on the site for contractors;
- electrical network for living units, offices and service structures;
- water supply for living units through polyethylene pipes connected to storage;
- wastewater treatment system.
- solid waste collection point.

4.3.5. Earthworks

Clearing activity is required to remove shrubs and trees from the planned footprint (±261 ha). Due to the flatness of the development area, limited earthworks are envisaged for the installation of the PV module mounting systems. The mounting systems will consist of metallic frames to be assembled on-site, supported by pre-bored cast-in-situ concrete piles. Concrete ballasted footing foundations are also possible.

Earthworks will be required during the construction of internal roads and access road. The vertical alignment of the roads will not present any significant challenges due to the flatness of the terrain so that no deep cuts or fills will be required.

Given the low rainfall, flat topography and low flow speed of run-off - no formal storm water structures are required as the proposed gravel roads will be developed at ground level, so as not to disturb the natural flow of storm water. This means that run-off will not be concentrated, and the existing drainage patterns will be left undisturbed.

Small earthworks will be required for the installation of the medium-voltage stations. None of these activities should require earthworks in excess of 500 mm cut or fill.

Only the foundation plate for the small high-voltage substation may require earthworks in excess of 500 mm cut or fill (the footprint will be up to 10 000 m^2). The topsoil stripping will result in temporary spoils heaps which must be spread over the site upon completion of the project.

Underground cables will be laid down along the internal roads.

The concrete necessary for the basements of the medium-voltage stations, the high-voltage substation, the control building and the warehouse will be provided from commercial sources in the vicinity of the development. Gravel needed for construction of internal roads will be obtained from commercial sources in Lichtenburg.

4.4. TRAFFIC IMPACT OF THE PROPOSED DEVELOPMENT

4.4.1. Traffic impact – construction phase

Siyazi (Pty) Ltd was appointed to conduct a Traffic Impact Assessment in order to assess the possible impacts the proposed development might have on traffic in the area. The draft assessment report is included in Annexure J of this Scoping Report.

Medium and heavy trucks will access / leave the site only during the working days (Monday to Friday), during daytime. The provision of a fuelling area on the work site could reduce the load of heavy vehicles on public roads. The installation of one steel fuel tanks (capacity of <30 000 litres) is recommended.

The relevant section of Road R505, where the proposed development is intended to be located, is in a rural setting with limited farming activity in the area and as determined from the 12-hour manual traffic counts a low volume of vehicle traffic along the relevant section of Road R505. The impact of the existing vehicle traffic volumes on Road R505 and other existing developments is negligible in all aspects of road-related impacts.

The following recommendations are made from a traffic-engineering perspective as part of the proposed development relevant to all phases:

a) As part of the construction phase, a dedicated loading and off-loading area on site should be established where workers can safely be loaded and off-loaded by public transport or arranged transport.
b) From a road safety perspective, dust suppression on the proposed access road (relevant for gaining access via Point A or Point B) should be conducted when required to avoid road visibility issues caused by dust from vehicles making use of the road, which could lead to vehicle accidents.

4.4.2. Traffic impact – operation phase

The traffic impact during the operation phase will be insignificant, considering that about 60/70 people will work on the PV facility, in the following manner:

- during the daytime approximately 35 people;
- during the night-time 15 people.

The following recommendations are made as part of the detailed design phase and Town Planning process of roads for the proposed development:

a) Approval for the position and geometric layout for the proposed access intersection from and to Road R505 should be obtained from the South African National Roads Agency SOC Ltd.

In conclusion of the findings as part of the investigations, Siyazi Limpopo Consulting Services (Pty) Ltd is of the opinion that the proposed development would have a manageable impact on the relevant road network during all phases, as long as the mitigation measures are implemented as recommended in the Traffic Impact Assessment Report. In this case, it is therefore recommended that authorisation be granted.

5. PROJECT ALTERNATIVES

The EIA Regulations, 2014, as amended, Section 28(1)(c) and NEMA, Section 24(4), require investigation and consideration of feasible and reasonable alternatives for any proposed development as part of the environmental impact assessment process. Therefore, a number of possible alternatives for accomplishing the same objectives must be identified and investigated.
The following are taken into account when considering alternatives:

- the property on which, or location where, it is proposed to undertake the activity;
- the location within the current identified site;
- 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 (schedule, process);
- the sustainability of other alternatives, and
- the option of not implementing the activity (No Go Alternative).

5.1. SITE ALTERNATIVES

Several layout locations have been inspected to find out the best solution for the PV power plant. The following selection criteria were applied:

- Connection availability and proximity
- Land availability
- Sufficient land surface area (±261 ha)
- Current land use
- Environmental impact (biodiversity)
- Agricultural potential
- Solar radiance
- Socio-economic issues (land cost and local community unemployment)
- Occurrence of Heritage resources

5.1.1. SITE ALTERNATIVE 1

Initially, at the start of the application process the applicant intended to develop the proposed Lichtenburg Solar Park in the south-western corner of the farm. The landowner, Ditsobotla Local Municipality, has not approved this position as this site will not be in line with any future planning.

The north-western corner of the farm was agreed on to develop the proposed solar park.

The site alternative was based on the landowner's direction, which in this case, is the local municipality. The sit location is solely based on the direction given by the local municipality.

5.2. TECHNOLOGY ALTERNATIVES

5.2.1. PV Plant

The alternative to PV for producing energy from the sun is the thermal solution. There are different forms of this technology: linear Fresnel, parabolic trough or tower. These technologies can also be with or without thermal storage and they can use diathermic oils or, the more sophisticated ones can use water and/or molten salts.

The final choice is the **PV option** because these kinds of project result in:

- lower construction costs;
- lower operating and maintenance costs (O&M);
- it is a simpler, quicker and more experienced technology; and
- lower environmental impact,.

5.2.2. Wind Power Plant

Another alternative to PV for producing energy from the sun is electrical energy form wind. A wind energy facility has a significant visual impact especially where it is located in a relative flat topographical area. Most important, the project site is not windy enough to be considered suitable for a wind farm. The PV option is thus still a better choice than wind energy based on the same reasons given above.

5.2.3. Alternatives for the Mounting System of the PV Modules

Preferred technical solutions for the proposed solar park entail PV modules mounted on fixed mounting systems (alternative option 1) or horizontal single-axis trackers (alternative option 2).

The tracking solution is the best performing in terms of efficiency because its energy production is approximately 20% more if compared with fixed systems. This type of technology is characterized by higher technical complexity and higher installing and maintenance costs, if compared with the fixed mounting solution.

The selected tracking system is the horizontal single-axis tracker (SAT), which doesn't differ from the fixed system, except for the presence of the tracking devices and the orientation of the rows of the PV arrays (north - south instead of west – east direction).

The technology of mounting systems is under continuous evolution. Consequently, the final decision about the mounting system technology will be taken only at the commissioning date.
The selection of fixed mounting system or horizontal single-axis trackers will not affect the layout of the PV power plant or imply any additional visual or environmental impacts that will necessitate specific or different mitigation measures. The development will not exceed the planned footprint (165 ha) and the height of the structures (PV modules and support frames) will be maximum 4.5 m above ground level.

Both fixed and horizontal single-axis tracking solutions grant the reversibility of the development in respect of the terrain's morphology, geology and hydrogeology. This means that at the end of the PV plant's lifetime, the site can easily be returned to its status prior to the establishment of the PV plant.

5.3. NO-GO ALTERNATIVE

The no-go alternative is the option of not establishing a PV Power Plant on the site, or any of its alternatives. The environment will remain in its current state (status quo). This will not create any new employment opportunities, and therefore the anticipated economic benefits of the project will accrue to the study area. Should this alternative be selected the socio-economic and environmental benefits related to the use of renewable energy resources will not be realised with prejudice to the development of the area. The benefits related to the establishment of a renewable energy power plant are for example analysed in detail in the REFIT Regulatory Guideline published by NERSA (March 2009):

- ***Enhanced and increased energy security***: renewable energy plays an important role in terms of power supply, improving grid strength and supply quality and contemporarily reducing transmission and distribution costs and losses.
- ***Resource economy and saving***: the energy production by coal fired plants consumes a significant amount of water, this amount of water will be saved if a renewable energy facility like the proposed one is put in operation. This will be beneficial on the large scale for the water conservation measures that the country is currently undertaking.
- ***Support of new technologies and new industrial sectors***: the development and establishment of renewable energy power plants contribute to the growth of new technologies and new industrial sectors with benefits for its economy.
- ***Exploitation and capitalization of South Africa's renewable resources***: with the aim of increasing energy security.
- ***Employment creation and career opportunities***: the construction and operation of a renewable energy power plant contributes to job creation and new career opportunities.
- ***Pollution reduction***: the use of renewable energy resources decreases the demand and the dependence from coal and oil for electricity generation.
- ***Contrast to Global warming and climate mitigation***: the development of renewable energy contributes to reduce global warming through the reduction of greenhouse gas (GHG) emissions.
- ***Protection of natural foundations of life for future generations***: the development and establishment of renewable energy power plants offers the opportunity of consistently reducing the risks related to climate change caused by CO^2 and CO emissions, therefore preserving life for future generations.
- ***Acceptability to society and community***: the use of renewable energy is largely accepted by society and community as a mean to reduce pollution concerns, improve human health and wellness, protect the environment, the ecosystem and climate;
- ***Commitment to and respect of international agreements***: in particular in light of the possible commitment to the Kyoto Protocol.

6. STATUS QUO OF THE RECEIVING ENVIRONMENT

The receiving environment is described using a combination of specialist inputs, on-site observations, a review of existing literature and utilizing Geographic Information Systems (GIS) planning tools.

6.1. PROPERTY DESCRIPTION AND CURRENT LAND USE

The proposed development is planned north of Lichtenburg and directly east of the R505 between Lichtenburg and Ottoshoop in the Ditsobotla Local Municipality in Ngaka Modiri Molema District, North West Province. The project is located on Portion 10 of farm Lichtenburg Town and Townlands 27 IP.

6.2. ENVIRONMENTAL FEATURES

6.2.1. Environmental Screening Report

Table 3. Environmental Screening Tool Table

Theme	Very high	High	Medium	Low	Specialist studies conducted	Motivation for no Specialist Studies
Agriculture	X				X	To be included in EIA Report
Animal species				X	X	
Aquatic biodiversity	X				X	
Archaeological and Cultural Heritage				X	X	
Avian		X			X	
Civil Aviation				X	X	An application for approval will be submitted to the CAA.
Defence				X	X	
Landscape	X				X	
Paleonthology	X				X	
Plant species			X		X	
RFI			X		X	
Terrestrial Biodiversity	X				X	

The following environmental sensitivities are identified for the project area:

- Agriculture Theme

  Sensitivity - Very High land capability

  A sensitivity analyses was conducted to identify the most suitable site for the development. Results and mitigation measures included in Agro-Ecosystem Specialist Report (Annexure F).

- Animal species Theme

  Sensitivity - Low

  A sensitivity analyses was conducted to identify the most suitable site for the development. Results and mitigation measures included in Terrestrial Biodiversity Impact Assessment (Annexure C).

- **Aquatic Biodiversity Theme**

  Sensitivity - Very high

  The project area is located within Strategic Water Source Area. There are no wetland features located within the proposed development area. See Terrestrial Biodiversity Impact Assessment (Annexure C) and Wetland Statement in Annexure E.

- **Avian Species Theme**

  Sensitivity - High

  The avifaunal assessment conducted (Annexure D) concluded that the development of the proposed Lichtenburg Solar Park would have a medium impact on the bird communities and will cause a slight impact on the ecological process of the overall bird community. The biggest concern is the threat the power lines within this area hold to threatened species such as the three vulture species present at the site.

- **Civil Aviation Theme**

  Sensitivity - Low

  An application for approval will be submitted to the Civil Aviation Authority.

- **Defence Theme**

  Sensitivity - Low

  Combined Defence, Civil Aviation assessment and Radio Frequency Assessment will be done.

- **Paleontological Theme**

  Sensitivity - Very High

  Based on the fossil record but confirmed by the site visit and walk through there are NO FOSSILS or trace fossils visible even though fossils have been recorded from rocks of a similar age and type in South Africa. It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. From a palaeontological perspective the proposed PV development should proceed (see Annexure H).

- **Plant Species Theme**

  Sensitivity - Medium

  The botanist concluded that the development can be supported provided that the mitigation measures and sensitivity map are implemented – Annexure C.

- **RFI Theme**

  Sensitivity - Medium

  Combined Defence, Civil Aviation assessment and Radio Frequency Assessment will be done.

- **Terrestrial Biodiversity Theme (Annexure C)**

  Sensitivity - Very High because of nearby CBA and ESA areas

  The proposed development footprint area is in ONA (Other natural Areas). The management objective for this area is to maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern (see Annexure C).

6.2.2. Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

A relatively high number of solar park projects are planned in the area. However, none of the planned developments have already been developed. The following wind and solar projects, proposed with 30 km from the project site, received and/or applied for an Environmental Authorisation according to the DFFE database:

Table 4. List of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of Application	Distance from proposed area (km)
1	14/12/16/3/3/1/1062/AM1	Solar PV	Approved	19.0
2	14/12/16/3/3/2/1062	Solar PV	Approved	18.1
3	14/12/16/3/3/1/1062/AM1	Solar PV	Approved	16.5
4	14/12/16/3/3/2/1093	Solar PV	Approved	12.0
5	12/12/20/2149/A3	Solar PV	Approved	14.0
6	14/12/16/3/3/2/975/AM1	Solar PV	Approved	1.5
7	14/12/16/3/3/2/557	Solar PV	Approved	4.3
8	14/12/16/3/3/2/1092	Solar PV	Approved	1.0
9	14/12/16/3/3/2/1091	Solar PV	Approved	2.0

Table 5. List of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area – additional information

No	EIA Reference No	Project Name	Project Capacity [MW]	Applicant	Date of application [aaaa/mm/dd]
1	14/12/16/3/3/1/1062/AM1	Proposed Hibernia Solar Energy Facility, Ditsobotla Local Municipality, North West Province.		Hibernia Solar (Pty) Ltd	2015/03/15
2	14/12/16/3/3/2/1062	Proposed Hibernia Solar Energy Facility, Ditsobotla Local Municipality, North West Province.		South African Mainstream Renewable Power Developments (Pty) Ltd	2014/01/06
3	14/12/16/3/3/1/1062/AM1	Proposed Hibernia Solar Energy Facility, Ditsobotla Local Municipality, North West Province.		Hibernia Solar (Pty) Ltd	2015/03/15
4	14/12/16/3/3/2/1093	Proposed development of Lichtenburg 3 PV solar energy facility and associated infrastructure, Ditsobotla Local Municipality, North West Province.	100	ABO Wind Lichtenburg 3 PV (Pty) Ltd	2018/08/24
5	12/12/20/2149/A3	Proposed establishment of a photovoltaic (Pv) installation at the Bloemfontein Airport, Free State Province.		ACSA PV	2014/05/29

6	14/12/16/3/3/2/975/AM1	The 75MW Tlisitseng PV2 SEF and its associated infrastructure near Lichtenburg, Ditsobotla Local Municipality, North West Province.	75	BioTherm Energy (Pty) Ltd	2017/09/26
7	14/12/16/3/3/2/557	Proposed Watershed Solar Energy Facility, Ditsobotla Local Municipality, North West Province.	75		2013/08/06
8	14/12/16/3/3/2/1092	Proposed development of the Lichtenburg 2 solar energy facility and its associated infrastructure, Ditsobotla Local Municipality, North West Province.	100	ABO Wind Lichtenburg 2 PV (Pty) Ltd	2018/08/14
9	14/12/16/3/3/2/1091	Proposed development of Lichtenburg 1 solar PV energy and associated infrastructure, Ditsobotla Local Municipality, North West Province.	100	ABO Wind Lichtenburg 1 PV (Pty) Ltd	2018/08/24

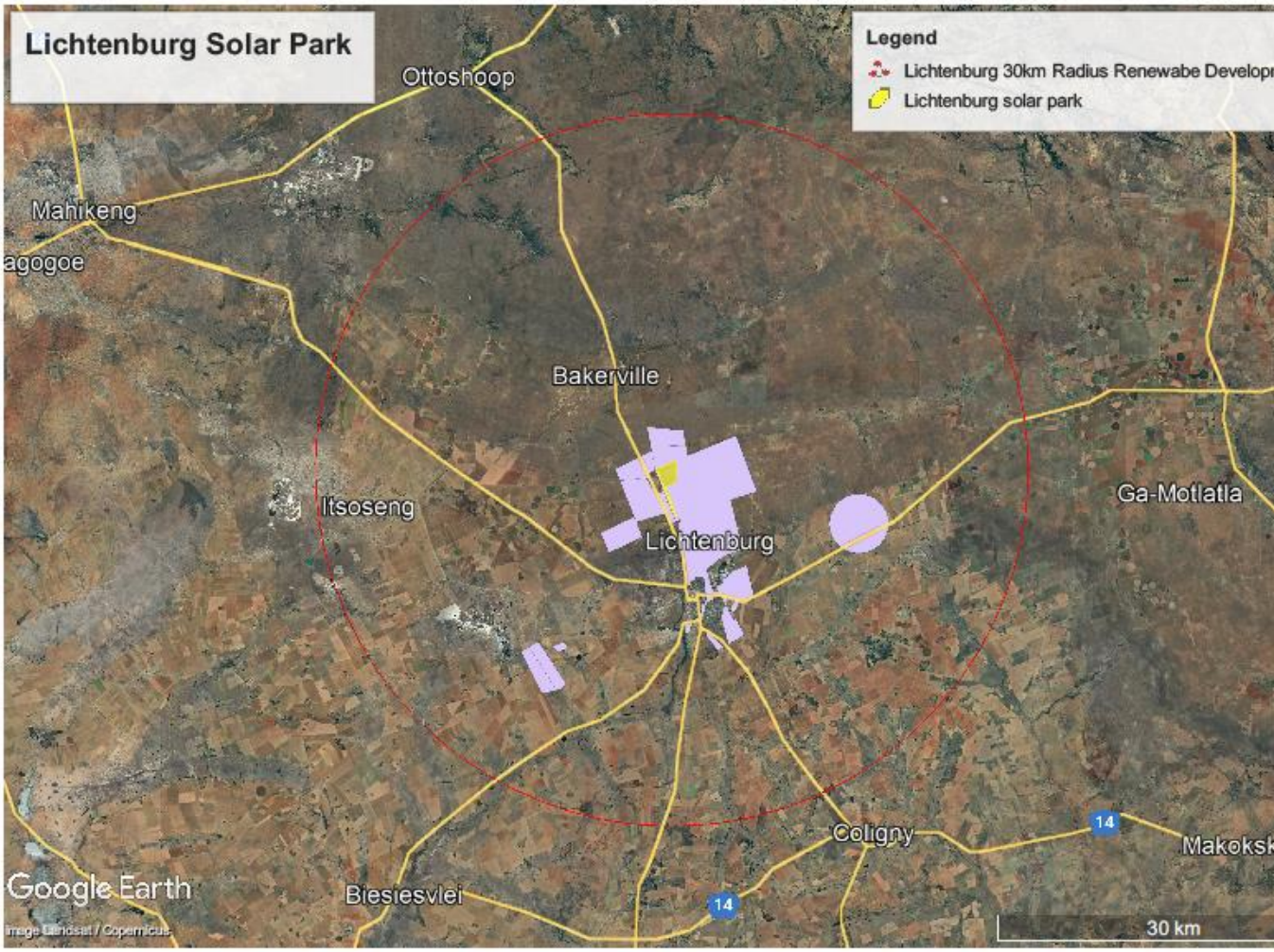

Figure 5. Google Map of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

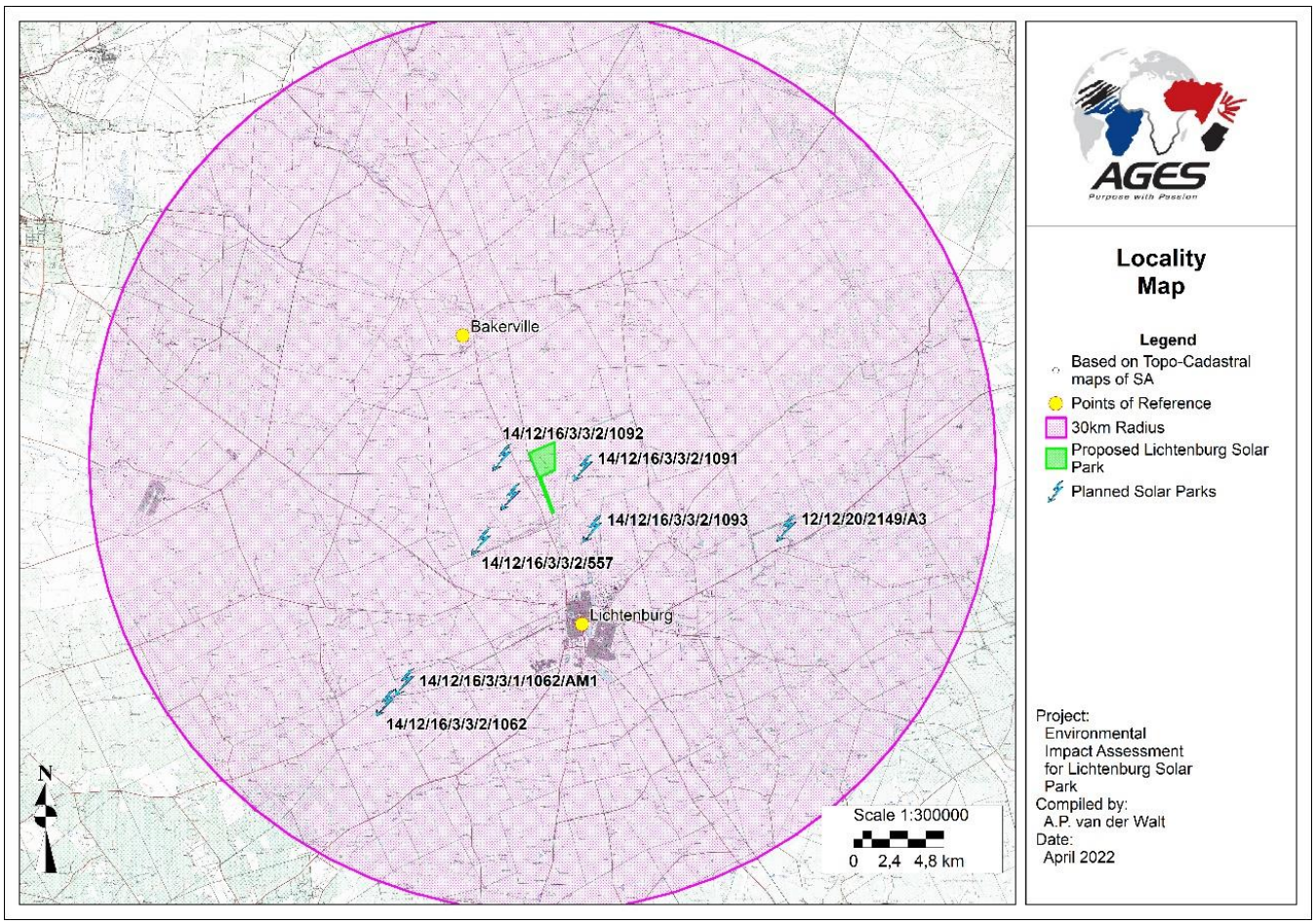

Figure 5. Map of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

It should be noted that none of these projects, applied for, have been built so far. A number of these applications have lapsed or have been withdrawn. No additional information was found about these solar projects.

For these reasons, the cumulative impact cannot be assessed at this stage. Additional investigation will be conducted during the EIA phase, to check the real status of these projects and get more information, to assess the cumulative impact in the case all the projects are successful and built.

6.2.3. Climate

The climate for the region can be described as warm-temperate. In terrestrial environments, limitations related to water availability are always important to plants and plant communities.
The study area is situated within the summer rainfall region with very dry winters and severe frost that occurs fairly frequently (37 days) during the colder winter months.
The mean annual precipitation is 593mm, while the mean annual temperature is 16,1˚C. The monthly distribution of average daily maximum temperatures for Lichtenburg ranges from 17.7°C in June to 30°C in January. The region is the coldest during June when the mercury drops to 0°C on average during the night.

6.2.4. Topography, drainage and Land use

The topography of the site can be described as generally favourable, when considering that most of the area consists of slopes of less than 1:5.

Site is located at an altitude of 1520 meters above mean sea level (AMSL).

Most properties situated within a 500m radius are being used for livestock and game farming. The proposed development land is used for wildlife grazing at present. The natural vegetation of the site is mostly intact.

The site is located within the C31A quaternary catchment and is situated in the Lower Vaal Water Management Area. Drainage occurs as sheet-wash into the drainage channels to the south of the site, namely the Klein Harts River that eventually drains into the major river namely the Vaal River that occurs to the south of the site.

6.2.5. Soils and geology

Geology is directly related to soil types and plant communities that may occur in a specific area (Van Rooyen & Theron, 1996). A Land type unit is a unique combination of soil pattern, terrain and macroclimate, the classification of which is used to determine the potential agricultural value of soils in an area. The land type unit represented within the study area include the Fa11 land type (Land Type Survey Staff, 1987) (ENPAT, 2001). The land type, geology and associated soil types is presented in Table 6 below as classified by the Environmental Potential Atlas, South Africa (ENPAT, 2000).
Soils associated with the site are mostly very shallow Mispah or Glenrosa soils associated with chert bedrock.

Table 6. Land types, geology, and dominant soil types of the proposed development site

Landtype	Soils	Geology
Fa11	Glenrosa and/or Mispah forms (other soils may occur), lime rare or absent in the entire landscape	Dolomite and chert belonging to the Chuniespoort Group; chert gravels are abundant on middle and footslopes including valley bottoms.

6.2.6. Ecology (fauna & flora)

A Terrestrial Biodiversity Impact Assessment (Annexure C) was conducted by AGES to describe the ecology (fauna and flora) present in the site, to assess its ecological sensitivity and to indicate the most suitable areas for the proposed development. A pre-screening site visit was conducted to determine if the assessment was accurate and if the studies recommended should be conducted. After the site visit the following was concluded:

- The site has a HIGH Sensitivity from a terrestrial biodiversity perspective due to the presence of indigenous grassland with protected trees.
- The site has a Medium Sensitivity from an Animal Species Theme Perspective due to the presence of natural fauna habitats.
- The site has a Medium Sensitivity from a Plant Species Theme Perspective due to the presence of indigenous grassland with protected tree species.

After the assessment, it was concluded that a detailed terrestrial biodiversity, plant species theme and animal species theme assessment should be conducted. For this purpose, detailed ecological (fauna habitat & flora) surveys were conducted on 11 April 2022 to verify the ecological sensitivity and ecological components of the site at ground level. This report is included in Annexure C of the Draft Scoping report.

6.2.6.1. Vegetation types

The development site lies within the Grassland biome. The Grassland Biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu Natal and the Eastern Cape. The topography is flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level. Grasslands (also known locally as Grassveld) are dominated by a single layer of grasses.

The most recent classification of the area by Mucina & Rutherford shows that the site is classified as Carletonville Dolomite Grassland. The landscape features of this vegetation type are slightly undulating plains dissected by prominent rocky chert ridges. Species-rich grasslands form a complex mosaic pattern dominated by many species. The conservation status of the Carletonville Dolomite Grassland is Least Concern with small extent conserved in statutory reserves and almost 25% already transformed for cultivation, urban sprawl or mining activities (Sanbi, 2018).

The proposed development site occurs on a landscape on slightly undulating to flat plains. The importance to survey the area to have a better understanding of the ecosystem and the potential impact of the solar development on the natural environment was identified as a key factor, and subsequently the footprint areas was completely surveyed. The site forms part of a larger farm used for wildlife grazing. The vegetation units on the site vary according to soil characteristics, topography, and land-use. Vegetation units were identified on the footprint development sites and can be divided into 3 distinct vegetation units according to soil types and topography.

The vegetation communities identified on the proposed development site are classified as physiographic physiognomic units, where physiognomic refers to the outer appearance of the vegetation, and physiographic refers to the position of the plant communities in the landscape. The physiographic-physiognomic units will be referred to as vegetation units in the following sections. These vegetation units are divided in terms of the land-use, plant species composition, topographical and soil differences that had the most definitive influence on the vegetation units. Each unit is described in terms of its characteristics and detailed descriptions of vegetation units are included in the following section.

A species list for the site is included in Appendix A, while a plant species list for the quarter degree grid square (QDS) is included in Appendix B. Photographs of each unit is included in the next section to illustrate the grass layer, woody structure, and substrate (soil, geology etc.). The following vegetation units were identified during the survey:

1. *Loudetia flavida – Elionorus muticus* rocky grassland.
2. Rocky grassland with bushclumps.
3. *Cymbopogon pospischilii – Schizachyrium sanguineum* dyke grassland.

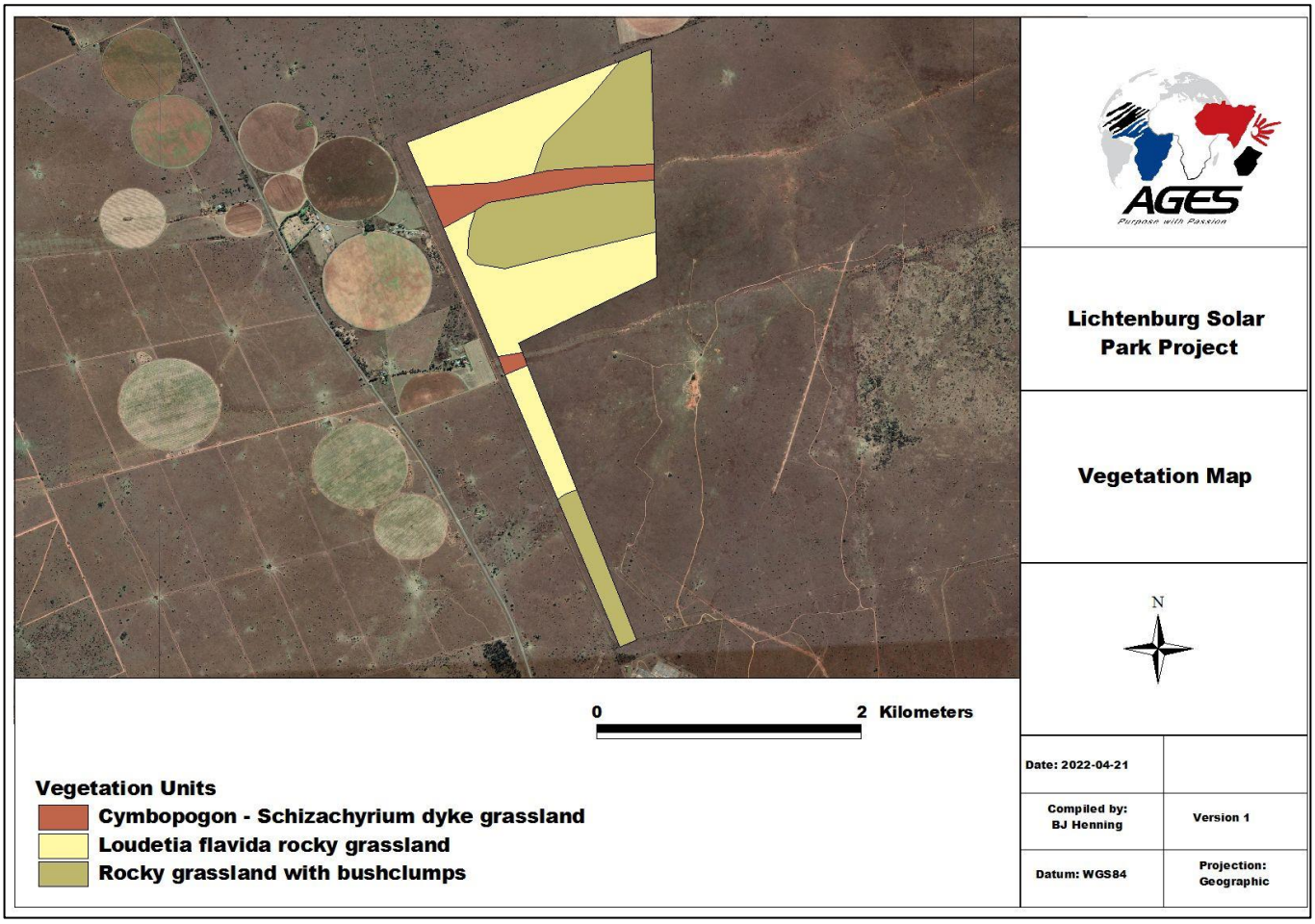

Figure 6. Vegetation Unit Map of the proposed development area (From Biodiversity report)

- Loudetia flavida – Elionorus muticus rocky grassland

This vegetation unit comprises a large part of the study area and occurs on slightly undulating terrain within the southern and northern sections of the study area. The soil is shallow rocky soils derived from chert with rocks covering 20-30% of the area. There are no trees present with the grasses having the highest cover. The grass layer is dominated by species such as *Schizachyrium sanguineum, Loudetia flavida, Themeda triandra, Elionorus muticus* and *Eragrostis lehmanniana*.

The vegetation unit is classified as having a medium sensitivity due to the due to the widespread status of this vegetation unit within the larger project area. The development of the solar development is considered suitable in this area.

- Rocky grassland with bushclumps

This vegetation variation is characterized by the same herbaceous layer as rocky grassland but differs due to the presence of scattered bushclumps occurring through the area. Typical tree and shrub species include *Searsia lancea, Searsia pyroides, Grewia flava* and *Diospyros lycioides*. Substrate is shallow soils, although slightly deeper patches of Hutton soils occur where the bushclumps occur.
The vegetation unit is classified as having a medium sensitivity due its widespread occurrence in the Grassland Biome. The eradication of protected trees would need a permit from DAFF. Where possible the larger protected trees such could be incorporated as part of the solar development. The development of the solar development is considered suitable in this area.

- Cymbopogon pospischilii – Schizachyrium sanguineum dyke grassland

This grassland variation occurs on narrow sections of the project area for the solar plant and powerline and represent dolerite dykes characterised by deeper, more fertile loamy soils of the Hutton soil form. The grass layer is characterised by species such as *Themeda triandra, Cymbopogon pospischilii, Hyparrhenia hirta, Cynodon dactylon* and *Schizachyrium sanguineum,* while isolated individuals of *Vachellia erioloba* also occur in the area.
The vegetation unit is classified as having a medium sensitivity due its widespread occurrence in the Grassland Biome. The eradication of protected trees would need a permit from DEFF. Where possible the larger protected trees should be incorporated as part of the solar development. The development of the solar development is considered suitable in this area.

6.2.6.2. Red Data Species

The potential that *Plinthus rehmanni* occur on the proposed development site is considered medium to low. Ecological monitoring should however still be implemented during the construction phase and specific sensitive habitats (riparian) needs to be avoided to ensure that any potential red data species potentially missed during the field surveys are preserved and not potentially impacted on.

6.2.6.3. Protected Species

Plant species are also protected in the Northwest Province according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). According to this legislation, no person may pick, import, export, transport, possess, cultivate, or trade in a specimen of a specially protected or protected plant species. The Regulations, included in the Act, provide an extensive list of species that are protected, comprising a significant component of the flora expected to occur on site. If applicable, applications for permits will be submitted to the Provincial authorities.
After a detailed survey was conducted during April 2022, no listed protected species in the Act was found in the footprint areas of the project area.

6.2.6.4. Protected Trees Species (NFA)

The National Forest Act,1998 (Act No.84 of 1998) provides a list of tree species that are considered important in a South African perspective because of scarcity, high utilization, common value, etc. In terms of the National Forest Act of 1998, these tree species may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except under license granted by DWS (or a delegated authority). Obtaining relevant permits are therefore required prior to any impact on these individuals.

One tree species listed as protected under the national list of declared protected tree species as promulgated by the National Forest Act (NFA), 1998 (No. 84 of 1998) was observed in the project area. *Vachellia erioloba* is a protected tree species of concern that occurs in the area.

6.2.6.5. Invasive Alien species

The following alien invasive and exotic plant species were recorded on site during the surveys as stipulated in the Alien and Invasive Species Regulations (GNR 599 of 2014).

Table 7. Declared weeds and invader plants of the study area.

Species	Category
Achyranthes aspera	1b
Opuntia ficus-indica	1b

According to the amended regulations (No. R280) of March 2001 of the Conservation of Agricultural Resources Act 1983 (Act no. 43 of 1983), it is the legal duty of the land user/landowner to control invasive alien plants occurring on the land under their control.

6.2.6.6. Conclusions

An important aspect relating to the proposed development site should be to protect and manage the biodiversity (structure and species composition) of the vegetation types which surround the project area.

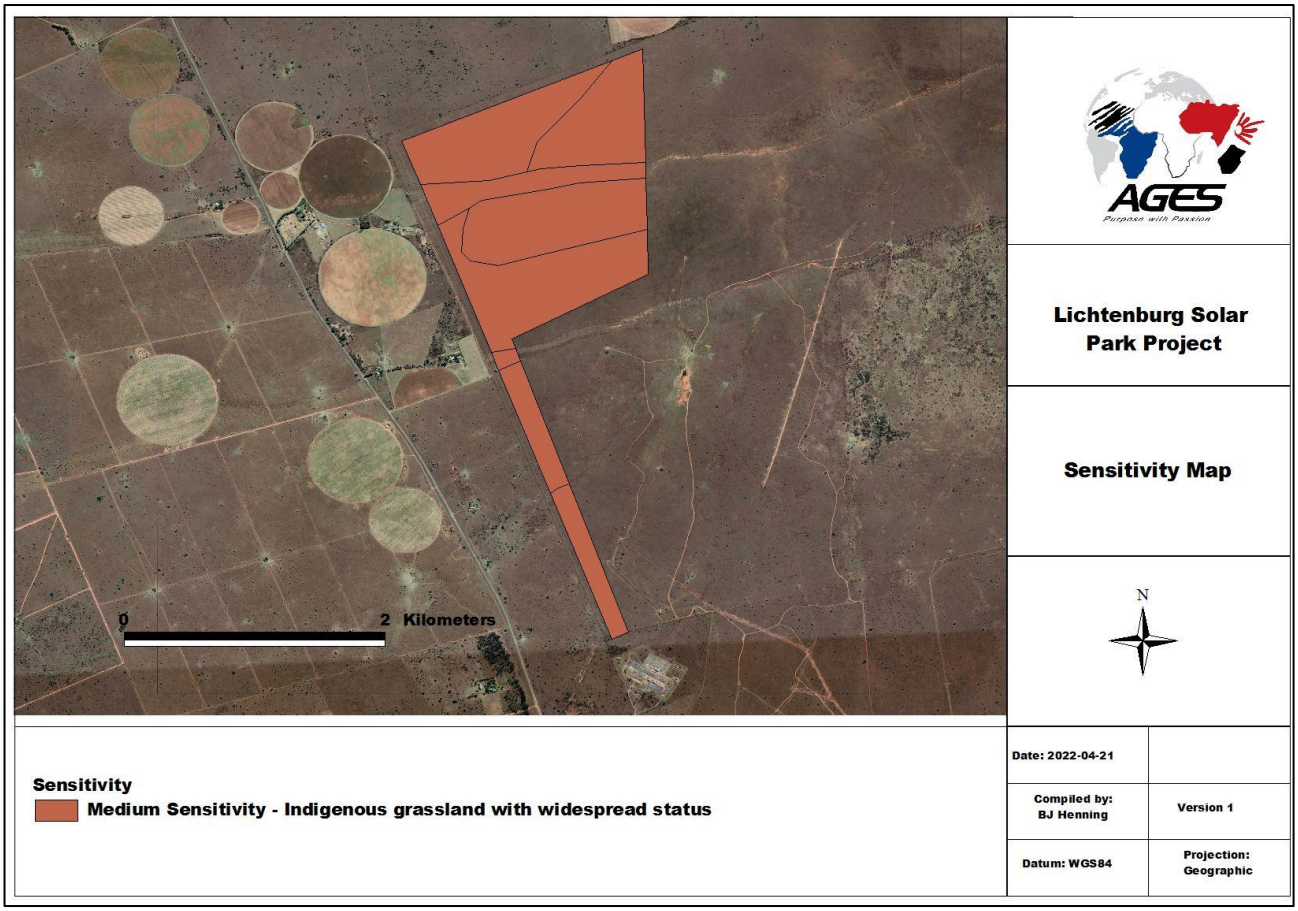

Figure 7. Sensitivity Map

6.2.6.7. Fauna

A survey was conducted during April 2022 to identify specific fauna habitats, and to compare these habitats with habitat preferences of the different fauna groups (birds, mammals, reptiles, amphibians) occurring in the quarter degree grid. During the site visits mammals, birds, reptiles, and amphibians were identified by visual sightings through random transect walks. In addition, mammals were also recognized as present by means of spoor, droppings, burrows or roosting sites.

Mammals

Much of the large and medium-sized mammal fauna that previously occurred on the project site is now locally extinct or occurs in small, fragmented populations in reserves. Most of the habitat types on the respective study sites are fragmented. Therefore, the expected mammalian richness on these areas is considered low, although slightly higher richness values are expected from the more intact grassland habitats. Antelope species that have been introduced into the fenced area include eland, blue wildebeest, blesbok, red hartebeest, gemsbok, springbok and waterbuck.

The Highveld Ecoregion contains a higher number of mammals, although only the orange mouse (*Mus orangiae*) is restricted to the ecoregion, and the rough-haired golden mole (*Chrysospalax villosa*) is near-endemic. The ecoregion also supports populations of several large mammal species, some of which are rare in southern Africa (Stuart and Stuart 1995). Among these are the brown hyena (*Hyaena brunnea*), African civet (*Civettictis civetta*), leopard (*Panthera pardus*), pangolin (*Manis temminckii*), honey badger (*Mellivora capensis*), striped weasel (*Poecilogale albinucha*), aardwolf (*Proteles cristatus*), oribi (*Ourebia ourebi*), and mountain zebra (*Equus zebra hartmannae*).

Predators that still roam freely in the area include larger predators such brown hyena, while smaller predators such as caracal, serval and honey badger are common throughout the larger area. Antelope species such as duiker and steenbok will roam freely through the area and are not restricted by game fences. Smaller mammal species such as honey badgers and serval can become habituated to anthropogenic influences, while other species such as brown hyena will move away from the construction activities and will seldom use the area.

Most mammal species are highly mobile and will move away during construction of the solar development. The most important corridors that need to be preserved for free-roaming mammal species in the area include the indigenous grasslands asnd wetlands surrounding the development site.

Avifauna

One major bird habitat system was identified within the project area, including the grassland.

Bird species richness is high within the Highveld Ecoregion (Harrison et al. 1997). However, Botha's lark (*Spizocorys fringillaris*) is the only bird species strictly endemic to the ecoregion, where it inhabits heavily grazed grassland. An additional six species of birds are near-endemics including whitewinged flufftail (*Sarothrura ayresii*), blue korhaan (*Eupodotis caerulescens*), southern whitebellied korhaan (*Eupodotis cafra*), Rudd's lark (*Heteromirafra ruddi*), melodious lark (*Mirafra cheniana*), buff-streaked chat *(Oenanthe bifasciata*), and yellow-breasted pipit (*Hemimacronyx chloris*) (Harrison et al. 1997).
Many grassland birds, several of which are endemic to southern Africa, show a clear preference for sour over sweet and mixed grassland, and some of these are essentially absent from the last two grassland

types, e.g. Bald Ibis, Redwing Francolin, Blackwinged Plover, Rudd's Lark, Botha's Lark, Blue Swallow, Buffstreaked Chat, Palecrowned Cisticola and Yellowbreasted Pipit. Examples of grassland species preferring sweet and mixed grasslands appear fewer but include Melodious Lark and South African Cliff Swallow. The extensive human pressures on the grassland biome have severe conservation implications for its avifauna: many of the globally threatened species present on the mainland of South Africa, Lesotho and Swaziland have major strongholds in the grassland biome and five of these (Bald Ibis, Whitewinged Flufftail, Rudd's and Botha's larks, and Yellowbreasted Pipit) are entirely restricted to this biome in the region.

There is a long list of red data bird species that have a geographical distribution with the site. The presence of the habitat of these species is mostly confined to the open water habitat that was not observed on site, although the probability of finding these species in degraded habitats is very low in general. More than 250 bird species have been recorded in the project area and surroundings. Globally threatened species include Secretarybird and Black-winged Pratincole. Congregatory birds are Egyptian Goose, Western Cattle Egret, Spur-winged Goose, South African Shelduck, Cape Shoveler and African Spoonbill.

According to Birdlife South Africa, the study area falls outside of any Important Bird Areas (IBA), identified within South Africa (www.birdlife.org.za). The conservation status of many of the bird species that are dependent on wetlands reflects critical status of wetland nationally, with many having already been destroyed. In the study area, no wetlands were identified.

Herpetofauna

Twenty-nine amphibians occur within the ecoregion, but none are endemic (Passmore and Carruthers 1995). No habitat occurs on site for frogs and toads. Amphibian species potentially occurring in the larger area include Common River Frog, Natal Sand Frog, Gutteral Toad, Raucous Toad and Bubbling Kassina. These species are non-threatened and widespread, and the development will not have any impact on amphibian conservation in the region. Few reptile species occur within the Highveld Ecoregion, due to its cool climate.

Ecoregion supports some of Africa's most characteristic reptile species, including Nile crocodile (*Crocodylus niloticus*), African rock-python (*Python sebae*), water monitor (*Varanus niloticus*) and veld monitor (*Varanus exanthematicus albigularis*). There are also two strict endemic reptiles: giant girdled lizard (*Cordylus giganteus*), and *Agama distanti* (Branch 1998). Several additional reptile species are near-endemics, including Drakensberg rock gecko (*Afroendura niravia*), giant spinytail lizard (*Cordylus giganteus*), and Breyer's whiptail (*Tetrodactylus breyeri)* (Branch 1998).

In the presence of dead termitaria, small geckos may be found on site. Some lizards (Yellow-throated Plated Lizard, Variegate Skink), typical for Highveld Grassveld, are expected on site. A variety of smaller snake species characteristic for Highveld Grassveld will be present (Common Wolf Snake, Brown House Snake), although some might be dependent on by the presence of dead termitaria. The only venomous snakes, which has been reported present and common, is, the Rinkhals, Mozambique spitting cobra, snouted cobra and the Puffadder for this QDS. All the reptile species are common and widespread, and as such the development will not have any impact on reptile conservation in the region. Sungazer lizard

occurs in some grassland areas, while southern spiny agama and striped harlequin snake may occur in small numbers in suitable habitat.
According to the existing databases and field survey the following number of fauna species included in the IUCN red data lists can potentially be found in the study area:

Table 8. Red data list of potential fauna for the study area

English Name	Conservation Status	Probability of occurrence on site
BIRDS (SABAP 2 LIST SPECIES)		
Abdim's Stork	Near Threatened	Moderate
African Marsh Harrier	Endangered	Moderate
European Roller	Near Threatened	Low
Black-winged Pratincole	Near Threatened	Moderate
Yellow-billed Stork	Endangered	Moderate
Martial Eagle	Endangered	Moderate
Secretarybird	Vulnerable	High
MAMMALS		
Bontebok	Vulnerable (2016)	Low - confined to protected areas / game farms
African Clawless Otter	Near Threatened (2016)	Low – confined to perennial rivers outside development footprint
Spotted Necked otter	Near Threatened (2016)	Low – confined to perennial rivers outside development footprint
HERPETOFAUNA		
Giant Bull Frog	Near Threatened	Moderate

The cumulative negative impacts of the proposed development will have a medium to low impact on the fauna of the area. There are three major categories of impacts on biodiversity namely:

- Impacts on habitat resulting in loss, degradation and / or fragmentation.
- Direct impacts on fauna and flora species, for example plants and animals that are endemic / threatened/special to a habitat will not be able to survive if that habitat is destroyed or altered by the development.
- Impact on natural environmental processes and ecosystem functioning. This can lead to an accumulated effect on both habitat and species.

6.2.6.8. Summary and results of the Terrestrial Biodiversity Impact Assessment

Detailed ecological (fauna habitat & flora) surveys were conducted during April 2022 to verify the ecological sensitivity and ecological components of the site at ground level. The vegetation was in a good condition and most species could be identified, although some species might have been missed because of the dense vegetation cover on the plains.

Most sensitive sections: It is evident from the distribution of biodiversity, presence of threatened species and sites of scientific interest, that the proposed development has the potential for negative impact on the flora and faunal of the study area. This is particularly true of the sensitive vegetation associated with the natural grasslands in the project area.

Most sensitive habitats: Many threatened species are grassland specialists, linked to these habitats either for breeding, feeding or shelter. Major impacts on sensitive grassland areas should be avoided wherever possible during construction. Where unavoidable impacts will occur on grassland, strict mitigation measures and legislation should be implemented (DAFF licence for eradication of protected trees etc.).

Monitoring of threatened species: Many endemic and protected species have been recorded in region. The EMP for the development should highlight the conservation status of these species and note that steps must be undertaken in conjunction with conservation authorities to protect or translocate any populations encountered during project actions. Ecological monitoring is recommended for the construction phase of the development considering the presence of protected trees and potential red data fauna on areas surrounding the site. The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the construction phase of the solar development should be considered a high priority. The proposed site for the development varies from being in a slightly degraded to pristine state.

A sensitivity analyses was conducted to identify the most suitable site for the development. From this investigation and ecological surveys, the following main observations was made:

- All the grassland areas have a Medium Sensitivity and development can be supported in the area provided certain mitigation measures are implemented. Where the clearance of the vegetation would cause protected trees or other fauna to be removed, permits should be obtained from the relevant authorities.

No red data plant species were found on the site due to the state of the vegetation and physical environment of the larger area mostly not being suitable for any of the red data plant species that may be found in the area.

Some potential rare fauna may also occur in the area, and specific mitigation measures need to be implemented to ensure that the impact of the development on the species' habitat will be low. Specific mitigation relating to red data fauna includes the following:

- Disturbances in close vicinity of the development (periphery) should be limited to the smallest possible area to protect species habitat.
- Corridors are important to allow fauna to move freely between the areas of disturbance.

Several ecological potential impacts were identified and assessed. A few of these were assessed as having potentially medium or high significance, including the following:

- Destruction or disturbance to sensitive ecosystems leading to reduction in the overall extent of a particular habitat;
- Increased soil erosion;
- Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts;
- Destruction/permanent loss of individuals of rare, endangered, endemic and/or protected species;
- Establishment and spread of declared weeds and alien invader plants;

- Soil and water pollution through spillages;
- Establishment and spread of declared weeds and alien invader plants;
- Impacts of human activities on fauna and flora of the area during construction;
- Air pollution through dusts and fumes from construction vehicles (construction phase).

Mitigation measures are provided that would reduce these impacts from a higher to a lower significance. A monitoring plan is recommended for the construction phase of the development should the proposed application be approved.

The proposed development should avoid sensitive areas such as wetland and riverine areas, while also allowing corridors of indigenous woodland on areas outside the development footprint to be preserved. Where sensitive areas of natural vegetation cannot be avoided, a few mitigation measures have been recommended to minimise and/or offset impacts (licence application for eradication of protected species.). Negative impacts can be minimised by strict enforcement and compliance with an Environmental Management Plan which considers the recommendations for managing impacts detailed above.

According to the Ecological Specialist, provided that the proposed development is consistent with the sensitivity map, guidelines stipulated and provided by North West and take all the mitigation measures into consideration stipulated in this report, the planned development can be supported.

6.2.7. Avifauna Assessment

An Avifauna Impact Assessment (Annexure D) was conducted by Ryno Kemp *(Cand.Sci.Nat.)* and Prof. Derek Engelbrecht *(Pr.Sci.Nat.)* in order to determine whether the proposed development would have negative impact on avifauna.

A detailed field survey was carried out on the 29th and 30th of March 2022. A field survey aid in filling in any information gaps identified from pilot investigations and published data. Bird communities were surveyed on the proposed development area as suggested by Gazetted Avifauna Assessment Protocols using the point count and line transect surveying techniques. ArcGIS was used to create random points across the surveying area for the proposed Solar Park area and line transect for the proposed power line development.

Proposed site is classified as mixed grasslands with only a few roads running through the proposed area. The eastern part of the proposed site has various power lines running from north to south to the Eskom Watershed Substation. Habitat at the proposed site is dominated by grasslands resulting in low species richness.

The desktop analysis recorded a total of 236 species that have been recorded during SABAP2 in the 9 pentads surrounding the proposed Lichtenburg Solar Park.

Of these, 32 were confirmed during the point survey count or are very likely to occur within the study area, and a further 40 are likely to occur. Species whose presence was confirmed include grassland species (e.g. Ant-eating Chat, Zitting Cisticola, Cape Longclaw and Orange River Francolin). Avian diversity on the site is low, a characteristic of natural grasslands (Freeman et al. 2018). Furthermore, endemic or near-endemic species to South Africa, such as Cape Sparrow, Cape Longclaw and Eastern Clapper Lark, were also observed during the field survey.

During the field investigation, various flight paths were observed from non-priority species. Priority species such as White-backed and Cape Vultures were seen soaring over the proposed solar park and power lines. Furthermore, vultures continuously visited the supplementary feeding site and roosted on nearby power lines. However, there are no distinct flight paths across the site, making it difficult to mitigate.

As for the Lichtenburg Solar Park development Avifaunal Specialist Assessment, 12 threatened or near-threatened species have been recorded in the greater region during the desktop survey, and only two were confirmed during the field survey. However, the proposed solar park is unlikely to pose a significant threat to any of the following species, but the proposed powerline connecting the solar park and substation poses a significant threat regarding collisions and electrocution with the infrastructure.

The findings of this survey and the relevant impact assessment concluded that the development of the proposed Lichtenburg Solar Park would have a medium impact on the bird communities and will cause a slight impact on the ecological process of the overall bird community. The biggest concern is the threat the power lines within this area hold to threatened species such as the three vulture species present at the site. Therefore, careful considerations need to be taken in terms of the proposed power line as the impact can be catastrophic. Still, the issuing authority must consider all prescribed mitigation measures and recommendations.

6.2.8. Preliminary Visual Assessment

A Visual Impact Assessment (Annexure I) was conducted by Graham Young an independent visual specialist to determine visual impact of the proposed solar park. The visual impact assessment analyses and rates the impacts of the proposed project on the visual environment as well as the sense of place of the receiving landscape.

The assessment of likely effects on a landscape resource and visual amenity is complex since it is determined through quantitative and qualitative evaluations. When assessing visual impact, the worst-case scenario is considered. Landscape and visual assessments are separate, although linked, procedures. The landscape, its analysis, and the assessment of impacts on the landscape all contribute to the visual impact assessment studies baseline. The potential impact on the landscape is assessed as an impact on an environmental resource, i.e. the physical landscape. On the other hand, visual impacts are assessed as one of the interrelated effects on people (i.e. the viewers and the result of an introduced object into a view or scene).

PV solar projects typically include medium to large-scale infrastructure that can cause change to the fabric and character of an area and possible visual intrusion in sensitive landscapes due to their physical presence.

Within a 5,0km radius of the Project site, the study area comprises primarily slightly undulating plains that gently slope to the north and to the south across the study area from a low west to east ridge line near the southern boundary of the site. The ridge line represents the highest elevation in the general area at 1515m AMSL. The development footprint follows this slope to the north with no PV arrays proposed south of it.

The landscape character types in the study area are common within the sub-region and have been impacted by agricultural, industry and quarry activities (specifically the southern part of the study area immediately north of Lichtenburg town). However, for much of the northern and eastern sections of study area the overwhelming sense of place of the is characterised by the open grazing lands and cultivation (mostly central pivot systems), resulting in a pastoral sense of place. The southern section is of mixed character and does not exert a strong sense of place, due to the variety of land uses with no unity.

Visual impacts will be caused by activities and infrastructure in both Project phases, i.e. construction and operational. Activities associated with the Project will be visible to varying degrees from varying distances around the project site. During the construction phase, the project's visibility will be influenced due to the preparatory activities, primarily earthworks and building works. During the operational phase, the visibility of the project will be caused by the established solar PV arrays, associated infrastructure and the proposed new 132 kV powerline.

The primary visual envelope, where open, partially obstructed views of the development would occur, is contained to the immediate north, west, east of the site and sections of the R505 as illustrated in Figure 6. However, due to the flat nature of the landscape and the prevalence of medium to tall trees west and north of the site, most of these views would be completely blocked or partially screened by vegetation, buildings and other structures. The Project's solar arrays would be most visible from east of the site in the game reserve where the landscape is open and there are fewer trees. Due to the low ridgeline along the southern boundary of the Project site and the prevalence of medium to tall vegetation southwest of the site, views from the south and southwest are mostly blocked. The sensitive viewing areas in the far southwest of the study area, would therefore not be affected.

The study area's scenic quality has been rated *low* to *moderate* within the context of the sub-region, and the project site is in a moderate rated landscape type. Sensitive viewing areas and landscape types have been identified and mapped, indicating potential sensitivity to the Project, mainly for residences of farmsteads to the immediate west and north of the site and visitors of the Lichtenburg Vakansie Oord Game Park east of the Project site.

Impacts on views are the highest when viewers are sensitive to change in the landscape, and the view is focused on and dominated by the change. The Project's visual impact will cause changes in the landscape that are noticeable to people viewing the landscape from the R505 provincial road and adjacent farmsteads. People living in the residential areas in the far south of the study area will not be affected by the Project.

The visual specialist's opinion is that all aspects of the project should be approved from a potential visual impact perspective, if mitigation/management measures are effectively implemented, managed, and monitored in the long term.

6.3. SOCIO-ECONOMIC ENVIRONMENT

A report on the socio-economic considerations related to the proposed project was compiled and is attached in this Report in Annexure L. The following issues can be anticipated:

- The national and local economies will benefit from civil contractor work, labour and building materials that will be required on site.
- After approval, the project will take approximately **18 months** to be built and will have a lifetime of 30 years. Approximately **100 people** are expected to be employed during the construction period. During operational phase, the power plant will require a permanent staff of approximately **40 people**. That impact will be positive.
- The presence of permanent security personnel may be beneficial to the overall safety and security situation in the area.
- Approximately **50% of the operational costs** will have a local economic return (mostly for maintenance works by local sub-contractors), then the impact will also be positive during the operational phase (30 years).
- The most important economic benefit is likely to be the experience that will be gained with regard to solar electricity generation in North West and in South Africa, considering that this forms part of a national strategic plan. This experience will be essential for the roll-out of the strategy, for efficiency improvements and for the establishment of a local manufacturing supply chain for equipment requirements. The project will also contribute towards reducing the carbon emissions per unit of electricity generated in South Africa, albeit very small to start with.
- Furthermore, the project will comply with the Economic Development Requirements, as requested by the REIPP Procurement Programme. This economic development programme identifies needs of the surrounding communities in order to have a positive socio-economic impact.
- The socio-economic impact of the proposed Lichtenburg Solar Project is considered positive and the application is supported, provided that all the mitigation measures proposed by specialist consultants are implemented.

6.4. AGRICULTURAL POTENTIAL

An Agricultural Agro-Ecosystem Assessment was done to assess the agricultural potential and value of the soil types on the site and the report is attached in Annexure F. A thorough investigation of the soil types of the proposed development site is necessary for an accurate classification of the soils. The main aim of the study is to identify the soil types on site and evaluate their specific characteristics to determine the agricultural potential of the soils.

The assessment of agricultural potential and land capability of the study area will be based on a combination of desktop studies to amass general information and then through site visit for status quo assessment, soil sampling and characterization, and also the validation of generated information from desktop studies:

- Definition of parameters of land as stipulated by Subdivision of Agricultural Land Act, No. 70 of 1970 and Amended Regulation of Conservation of Agricultural Resources Act No. 43 of 1983;
- Classification of high potential agricultural land in South Africa compiled by the Agricultural Research Council (Schoeman, 2004) for the National Department of Agriculture;
- Long-term climatic data record of the study area, obtained from Weather SA.
- Geophysical features of the site using Geographical Information System;
- Moisture availability class, determined through seasonal rainfall and fraction of the potential evapotranspiration (ARC, 2002);
- Field visit to the project site for general observation, survey of the farm in terms of vegetation, soils, water resources, terrain type and infrastructural profile;
- Previous and current land use of the farm and that of the neighbourhood;
- Other agro-ecological factors prevailing in the area;
- Agricultural potential of the property;
- Possible crop productivity or value of the farm for grazing purposes.

Impacts on the agricultural capability

The impacts associated with the proposed development on the agro-ecosystem capability will depend on the specific area where the development will take place. The following list of impacts is anticipated with the proposed developments on the soils and land capability in the area during the construction phase:

- Disturbance of soils (Soil compaction, erosion and crusting);
- Sterilisation of soil (soil stripping);
- Soil contamination due to leaching of soluble chemical pollutants;
- Loss of current and potential agricultural land.

Mitigation measures will be provided that would reduce these impacts from a higher to a lower significance. Furthermore, the proposed layout plan of the PV plant will be consistent with the agro-ecosystem maps and recommendations, and the impact on the sensitive soil forms on site should be kept to a minimum.

6.5. CULTURAL AND HERITAGE RESOURCES

An Archaeological Impact Assessment (Annexure G) was conducted by Beyond Heritage (Mr J van der Walt) to ascertain whether there are any remains of significance in the area that will be affected by the proposed development.

Published Stone Age and Iron Age archaeological sites are absent from the immediate study area. Stone Age lithic scatters occur near watercourses, and some were exposed due to diamond mining in the wider area, suggesting that the landscape was used since the ESA. However, currently, published references only include Later Stone Age sites such as Jubilee and Holkrans rock shelters, which are ~ 200 km south-east of Lichtenburg, as well as rock art occurring at Driekuil and Gestoptefontein (e.g., Wadley 1989, 1996; Bradfield & Sadr 2011; Hollmann 2013) to the south at Ottosdal.

Early Iron Age farmers settled at Broederstroom *ca*. 500 CE (Mason 1981), the oldest Iron Age site in the North West Province. Agropastoral communities preferred open woodland areas with readily available access to water and cultivatable soils. Due to their particular homestead economy, farmers did not occupy the central highveld area of Lichtenburg. During the Late Iron Age when climatic conditions became more favourable people started to occupy areas previously considered unsuitable (Maggs 1994; Huffman 2007). The earliest Iron Age farmers who moved into the North-West Province were Tswana-speakers such as the BaRolong probably from the 18th century onwards. According to traditional history BaRolong king Tau died in 1760 CE, he was succeeded by his son Nôtô. During the reign of Nôtô it is said that they settled in the region of Molopo, while others say it was only during the time of Morara's kingship, son of Nôtô. However, during the early 1820s Methodist missionaries had contact with BaRolong communities as they fled from the chaos caused by the ongoing Mfecane, settling near Maquassi hills in modern-day Potchefstroom. Peace was short-lived and communities decided in 1833 to move towards Thaba Nchu under the protection of king Moshoshoe. The region was also a focal point for *Voortrekkers* such as Hendrik Potgieter and Sarel Cilliers, as they moved further towards the interior violent battles took place between local Sotho-Tswana, Ndebele and Zulu chiefdoms *(*Matthews 1945; Breutz 1957; Giliomee & Mbenga 2007).

The surrounding area of Lichtenburg was only occupied from the 1850s as resources were few and the town was established in 1873. During the South African War 1899-1902, several skirmishes took place in the larger region. The area included concentration camps and the famous battle of Mafikeng took place close-by. Lichtenburg is also home to the infamous General Koos de la Rey. The town was the seat of the local Senator, and he died in 1914 on his way home from a meeting in parliament about South Africa's participation in World War I. During the 1920s the town experienced a diamond rush that lasted 10 years. Today Lichtenburg is known for cattle and crop farming (e.g., Bergh 1998; Scholtz & Theron 2000; van der Walt 2013; Coetzee 2017). The project area was utilised for grazing or agricultural fields since the 1900s (van Schalkwyk 2021).

On 16 February 1886 a Crown Grant was awarded to Abraham Jaco Nel of the farm Houthaalboomen No.208. (NASA *TAB, SS: 1174 R799/86*). In July 1965 Mr. F. J. Greeff, a Land Surveyor and Town Planner in Lichtenburg, wrote a letter to the Surveyor-General in Pretoria.

He attached a plan for the proposed subdivision of Portion 18 (a Portion of portion 12) of the farm Houthaalboomen 31 IP. He explained that the land would be split into two equal sections of 27 morgen each. The access route to the main road was indicated, and Greeff noted that there was no "Bantu" area in the vicinity of the farm. One residence was located on this portion of the farm, but no further improvements had been made on the land. It was noted that the land would be used for residential and agricultural purposes. (NASA *SAB, CDB: 3/722 TAD9/21/61*)

In a subsequent letter from the Surveyor-General it was explained that the portion referred to by Greeff would be known as Portion 19, as this was the new number. In November 1965 J. Van Veijeren, the Director of Local Management wrote to Greeff, indicating that his application for the subdivision of Portion 19 of Houthaalboomen 31 IP was granted and that the residence on this portion could remain to be used on the property. (NASA *SAB, CDB: 3/722 TAD9/21/61*)

In June 1966, Greeff once again applied to the Surveyor-General with regards to the subdivision of a portion of the farm. This portion was a consolidation of Portion 14 of Houthaalboomen 31 IP and the Remaining Extent of Portion 1 of the farm Priem 30 IP, together known as Houthaalboomen 25 IP. The land would only be used for agricultural and residential purposes. This application was granted by the Director of Local Management, J. H. Hanekom, on 12 August 1966. (NASA *SAB, CDB: 3/722 TAD9/21/61*)

On 1 October 1981 a representative of EVKOM (the Electricity Supply Commission) applied to the Department of Cooperation and Development for permission to construct single living quarters at the Watershed Distribution Station in the Lichtenburg area. This would serve as the residence for 14 black male workers that were employed by EVKOM. The communal living quarters would consist of a single-room building with a floor surface measuring 48,31 square meters. This building would be plastered and painted and have a roof of cement tiles. A kitchen, washing facilities (with warm water) and latrines would also be provided. This development would take place about 800 meters of the then Provincial Road. Up until that time these workers had resided in temporary huts, and it was deemed that the new permanent residential quarters would be an improvement on the huts. The development was recommended by the Commissioner of Lichtenburg in October 1981. Building would commence within three months from that time. (NASA *SAB, BAO: 3/4189 A12/2/6/L24/20*)

The Project area is a Greenfields site mainly used for game farming and breeding without any major focal points like pans or hills that would have attracted human occupation in antiquity. A previous HIA conducted for the study area (Hutten 2012) recorded no heritage resources of significance and the current assessment similarly recorded no sites of significance although isolated MSA flakes were noted. These were found occasionally scattered through the study area in direct contrast to high density sites to the west (van der Walt 2014, Van der Walt 2022a). Historical topographic maps and areal imagery also showed no structures or stonewalled settlements within the project area.

No heritage sites of significance occur within the impact area and no adverse impact to heritage resources is expected. Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Mitigation measures as recommended in this report should be implemented during all phases of the project. Impacts of the project on heritage resources is expected to be low during all phases of the development.

No adverse impact on heritage resources is expected by the project and it is recommended that the project can commence on the condition that the following recommendations (Section 10) are implemented as part of the EMPr and based on approval from SAHRA.

Recommendations for condition of authorisation:

- Implementation of a chance find procedure for the project.

6.6. PALAEONTOLOGICAL RESOURCES

A Palaeontological Impact Assessment (Annexure H) was conducted by Prof Bamford. The proposed site lies on the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) and in particular on the Oaktree and Monte Christo Formations that could preserve oolitic chert and stromatolites. The site visit walk down confirmed that there are NO FOSSILS in the project footprint. It is unknown whether there are fossils below the ground surface, therefore, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, developer, environmental officer or other designated responsible person once excavation activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

6.6.1. Recommendations of the Palaeontological Specialist

Based on the fossil record but confirmed by the site visit and walk through there are NO FOSSILS or trace fossils visible even though fossils have been recorded from rocks of a similar age and type in South Africa. It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the dolomites of the Oaktree and Monte Christo Formation (Malmani Subgroup, Chuniespoort Group, Pretoria Supergroup) and may be disturbed, so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the contractor, environmental officer, or other responsible person once excavations and drilling have commenced, then they should be rescued, and a palaeontologist called to assess and collect a representative sample. Since the impact on the fossil heritage is low, as far as the palaeontology is concerned, the project should be authorised.

6.7. TRAFFIC IMPACT ASSESSMENT

A Draft Traffic Impact Assessment Report was obtained after a pre-liminary Traffic Impact Assessment was conducted by Siyazi Limpopo Consulting Services (Pty) Ltd.

The purpose of the study was to assess the implications of the vehicular traffic that could potentially be generated due to the proposed development in terms of:

a. The traffic impact that the change in land use would have on the road and transport-related infrastructure.
b. Whether it is possible to accommodate the proposed development within acceptable norms from a traffic-engineering point of view.
c. The mitigating measures required to accommodate the proposed development within acceptable traffic-engineering norms.

6.7.1. Finding of the Draft Assessment

- Access to the proposed development will be via the provincial R505.
- The Access position from and to Road R505 for the proposed development was not finalised at the time of conducting this study, and therefore basic investigations were conducted to identify tentative access points which would be suitable from a traffic engineering and road safety perspective, for which two tentative proposed points were identified (Points A and B).

6.7.2. Recommendations and Terms of Reference for the Environmental Impact Assessment

The following recommendations are made from a traffic engineering point of view:

a. As part of the construction phase, a dedicated loading and off-loading area on site should be established where workers can safely be loaded and off-loaded by public or arranged transport.
b. From a road safety perspective, dust suppression on the proposed access road (relevant for gaining access via Point A or Point B) should be conducted when required to avoid road visibility issues caused by dust from vehicles making use of the road, which could lead to vehicle accidents.

6.8. AVIATION IMPACT ASSESSMENT

The aviation impact assessment was done by Tappas Aviation Consultant (Pty) Ltd and the report is attached in Annexure K of the Draft SR.

The development of solar developments throughout South Africa means that new overhead transmission lines are sometimes routed near existing civil and military airbases which can result in aerodrome safeguarding regarding the Obstacle Limitation Surfaces of airports and the potential interference on radio, radar and electronic navigation aids.

It was decided to assess the development using the methodology of the assessment of the Obstacle Limited Surfaces as well as the Approach/Departure Surfaces of Lichtenburg Airport. This will be done in accordance with the ICAO and SACAA safeguarding rules and regulations.

According to the SACAA Lichtenburg Airport is not a certified airport under Instrument Flight Rules. The possibility exist that the Lichtenburg Airport could become an Instrument Flight Rules airport in the future, therefore both the Obstacle Limited Surfaces as well as the Approach/Departure Surfaces will be assessed.

Conclusion:
Evidence from the assessment and the technical drawings show clearly that the Lichtenburg Solar Park will not interfere with the safeguarding of the Obstacle Limit Surfaces and the Approach/Departure Surfaces of Lichtenburg Airport (FALI).

7. IMPACT IDENTIFICATION AND ASSESSMENT

A clear statement will be made, identifying the environmental impacts of the construction, operation, maintenance and management of the proposed project. As far as possible, the suite of potential environmental impacts identified in the study will be quantified and the significance of the impacts will be assessed. Each impact will be assessed and rated. The assessment of the data, whereas possible will be based on broadly accepted scientific principles and techniques. In defect, judgements and assessments will be necessarily based on the consultant's professional expertise and experience.

As previously described, construction activities for the establishment of the proposed PV power plant include:

- land clearing activities necessary for preparation of the site and access routes;
- excavation and filling activities;
- transportation of various materials;
- construction of the storage structures;
- installation of the PV modules and construction of associated structures and infrastructure; and
- construction of the on-site high-voltage substation and of the four 22 kV power lines, for the connection to the on-site substation of the Lichtenburg Thermal Power Plant.

EXTENT

The extent of most of the construction activities is localized and impacts will only occur at the development site. Some activities will extend to adjacent landowners as access roads will be used which will lead to an increase in the traffic in the area. These will be further investigated and mitigations measures will be included in the EIA report.

DURATION

The impact of construction activities will only be for the duration of the construction phase, after which it will cease completely. (Construction period planned to last between a minimum of 6 months and a maximum 15 months).

PROBABILITY

The probability of impacts occurring during the construction is phase very high as there will be impacts on the vegetation as most will be removed to make way for the proposed development.

Please note that the evaluation of environmental impacts as a result of the proposed development will be discussed in detail in the EIA report. Environmental impacts associated with the operational phase of a solar energy facility may include visual and other impacts.

The decommissioning activities of the PV plant mainly include the removal of the project infrastructure and the restoring of the site *status quo ante*.

The identification of impacts will be based on:

- legal and administrative requirements;
- the nature of the proposed activity;
- the nature of the receiving environment;
- specialist studies and
- issues raised during the public participation process.

Potential impacts may include:

- Impacts on soils & agricultural potential;
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: High
  - Significance: Low
- Impacts on ground water;
  - Extent: Surrounding and adjacent land
  - Duration: Life of the project (approx. 30 years)
  - Probability: Medium
  - Significance: Low
- Impacts on the road system and traffic;
  - Extent: Surrounding and adjacent land
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- Impacts on air quality and potential emissions;
  - Extent: Regional
  - Duration: Life of the project (approx. 30 years)
  - Probability: Very Low
  - Significance: Very Low
- Geological, soil and erosion impacts;
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- Impacts on avifauna;
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- Impacts on vegetation;
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: High
  - Significance: Medium
- Impacts on heritage resources;
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- Noise impacts;
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Very Low

- Impacts on tourism;
  - Extent: Regional
  - Duration: Life of the project (approx. 30 years)
  - Probability: Unknown
  - Significance: Unknown

- Social impacts;
  - Extent: Regional & Locally
  - Duration: Life of the project (approx. 30 years)
  - Probability: High
  - Significance: High - Positive
- Visual impacts.
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Definite
  - Significance: to be determined
- Radio Frequency Interference
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: To be determined
  - Significance: To be determined

Please note that the statements above with regard to potential impacts are preliminary and have not been analysed as all the information to do this accurately has not been obtained yet.

In the following section: Plan of Study for EIA it is outlined which studies are to be conducted in order to evaluate the identified impacts and to propose mitigation measures.

The significance of the potential impacts can and will be determined once all the specialist studies have been obtained.

8. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS AND PUBLIC PARTICIPATION PROCESS

The environmental impact studies can be summarized in a two-phased approach:

- Phase 1: Environmental Scoping Phase
- Phase 2: Environmental Impact Assessment (EIA) and Environmental Management Program (EMPr)

The scope of the EIA procedure is to provide an assessment of all impacts related to the proposed project in compliance with the EIA Regulations 2014, as amended.

8.1. SCOPING PHASE

The Scoping Phase aims to produce the following:

- a description of the proposed activity, the property and the receiving environment;
- the identification of potential significant positive and negative impacts;
- the identification of opportunities and constraints, alternatives and mitigation measures which need to be evaluated and investigated during the successive EIA phase, especially in order to prevent environmental fatal flaws and sensitive or "no-go" areas.

The Scoping Phase includes the Public Participation Process. The PPP has the aim to identify concerns and issues by the interested and affected parties (I&AP's). Issues and concerns raised by the I&AP's and key stakeholders during the Public Participation Process will be collected, processed and addressed in the Comments and Response document which forms a part of this Final Scoping Report. All issues and concerns identified during the Scoping Phase are documented in this Draft Scoping Report which will be submitted to the DFFE together with a Plan of Study for EIA.

8.2. EIA PHASE

The next step of the EIA process is the development of guidelines for execution of the impact assessment and the compilation of an Environmental Impact Assessment Report.

The database of the stakeholders and I&AP's developed during the previous EIA process will be used as a reference to ensure that stakeholders are involved and participate in the second phase of the EIA process. All relevant issues considered during the Scoping Phase will be further investigated and assessed during the EIA Phase of this project. The EIA will involve various specialist studies and should provide an overall assessment of the biophysical, social and economic environment affected by the proposed project.

A detailed assessment will be carried out in terms of environmental criteria and rating of significant impacts of all options identified in the scoping phase. Appropriate mitigation measures will be identified and recommended for all significant impacts. These measures should be included in an Environmental Management Program (EMP) to be submitted together with the Environmental Impact Assessment Report (EIAR) to the DFFE.

During the EIA phase stakeholders and I&AP's will be notified in writing of the continuation of the project to the EIA Phase and will be informed as to the way forward and where and when the Draft Environmental Impact Assessment Report will be made available for review. Comments from the stakeholders and I&AP's on the Draft EIR and the Draft EMPr will be incorporated into the final EIAR.

The stakeholders and I&AP's will furthermore be informed of the final decision regarding the Environmental Authorisation and the appeal process.

8.3. PUBLIC PARTICIPATION PROCESS

The public participation process offers the opportunity to become actively involved through constant sharing of information. The main purposes of the public participation process are to ensure that:

- all relevant information in respect of the application is made available to I&AP's for their evaluation and review;
- reasonable opportunity is given to I&AP's to comment and to submit queries related to the proposed project;
- comments and queries by the I&APs to the Draft Scoping and to the EIA Reports are submitted and evaluated in a reasonable timeframe and in predetermined terms.

The notifications to the I&APs of the property owners adjacent to Portion 10 of the Farm Lichtenburg Town and Townlands 27 IP were completed.

The public was informed of the proposed development and the database of Interested and Affected parties was populated.

In the enclosed Annexure B (Comments & Responses Report), there is the list of all components of the public participation process. The public was informed of the project by means of:

- Site notices were put up at the proposed development site at 2 areas on the fences at the proposed development area on 3 March 2022.
- Background Information Documents (BIDs) were emailed to most of the Authorities involved on 8 March 2021.
- A Notice / Advertisement was published in the Noordwester local newspaper, appearing on Friday 4 March 2022 which is distributed in the general area.
- Emails of the BID were sent to other most of the relevant Authorities possible interested and affected parties/stakeholders (other I&APs).
- The initial Public Participation Process was run from 3 March 2022 until 11 April 2022.
- BIDs were sent to:
    - Ditsobotla Local Municipality - Administration
    - Local Municipality Ward Councillor
    - Ngaka Modiri Molema District Municipality
    - National Department of Agriculture
    - Department of Water & Sanitation

- North West Province Economic Development, Environment and Tourism: DEDECT
- North West Province Department of Agriculture & Rural Development Rural Development
- North West Province Department of Human Settlements, Public Safety and Liaison
- North West Province Public Works and Roads
- North West Province Department of Community Safety and Transport Management
- Eskom
- NW Provincial Heritage Resource Agency (PHRA)
- SAHRA General
- Department of Community Safety & Transport
- Chief Director: Land Restitution Support
- Department of Science & Technology
- Department of Transport Chief Director
- South African Civil Aviation Authority – SACAA
- South African Radio Astronomy Observatory (SARAO)
- Square Kilometre Array (SKA)
- DMR (Department of Mineral Resources)
- SANRAL (South African national Roads Agency Ltd) Northern Region
- Council for Scientific and Industrial Research (CSIR)
- DFFE Integrated Environmental Authorisations
- Strategic Infrastructure Developments
- DFFE Directorate: Climate Change & Air Quality
- DFFE Chief Directorate: Protected Areas Systems Management
- DFFE Chief Directorate: Biodiversity Conservation
- Endangered Wildlife Trust (EWT)
- Bird Life SA

- An I&AP Register was created and opened which will be maintained and added to as required.
- Registrations of I&APs'
- Few people registered as I&APs, but no comments were received during the initial public participation process from adjacent landowners and/or interested and/or affected parties.
- The Draft Scoping Report (in electronic format) will be made available for a 30-day commenting period for comments and will also be provided as hard copy on request.

8.3.1. Further steps in Public Participation Process

To ensure a transparent and complete public participation process the following steps are still to be taken during the rest of the EIA process:

- The Final Scoping Report and the Plan of Study for EIA will be submitted to the DFFE for review and approval
- Once the Final Scoping Report and the Plan of Study for EIA is approved by the DFFE, the Draft EIA Report will be submitted and made available for a commenting period of 30 days. Notifications will be sent out to inform registered I&APs and governmental organisations that the Draft EIA Report was submitted and is again available for comments.
- Registered I&APs and governmental organisations will be notified about the final decision of the DFFE (Environmental Authorisation granted or not).

9. PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

Hereinafter there is a brief description of the approach that will be used in the EIA study. Assumptions and sources of information will be identified, and the knowledge of local people will be incorporated in the final scoping study.

9.1. DESCRIPTION OF THE AFFECTED ENVIRONMENT

A further description of the affected environment will be provided. An additional indication of the sensitivity of the affected environment will be provided. Sensitivity, in this context, refers to the "ability" of an affected environment to tolerate disturbance, for example, if disturbance of the natural habitat results in the permanent loss of its biodiversity the affected environment could be categorised as having a "low tolerance" to disturbance and is, therefore, termed a highly sensitive habitat. Instead, if a habitat is able to withstand significant disturbance without a marked impact on its biodiversity, the affected environment could be categorised as having a high tolerance to disturbance (i. e. "low sensitivity" habitat).

9.2. IMPACT IDENTIFICATION AND ASSESSMENT

A clear statement will be made, identifying the environmental impacts of the construction, operation, maintenance and management of the proposed project. As far as possible, the suite of potential environmental impacts identified in the study will be quantified and the significance of the impacts will be assessed. Each impact will be assessed and rated. The assessment of the data, whereas possible will be based on broadly accepted scientific principles and techniques. In defect, judgements and assessments will be necessarily based on the consultant's professional expertise and experience.

Construction activities for the establishment of the Lichtenburg Solar Park include:

- the land clearing activities necessary for preparation of the site and access routes;
- the excavation and filling activities;
- the transportation of various materials;
- the preparation of the temporary worksite;
- the installation of the PV modules and construction of associated structures and infrastructure;
- construction of the on-site high-voltage substation and of the 132 kV power line, approximately 3.6 km long, for the connection to the on-site substation of the Lichtenburg Solar Power Plant.

Environmental impacts associated with the operational phase of a solar energy facility may include visual and other impacts.
The decommissioning activities of the PV plant mainly include the removal of the project infrastructure and the restoring of the site *status quo ante*.
The identification of impacts will be based on:

- legal and administrative requirements;
- the nature of the proposed activity;
- the nature of the receiving environment;
- amended specialist studies; and
- issues raised during the public participation process.

Potential impacts may include:

- Impacts on soils & agricultural potential;
- Impacts on ground water;
- Impacts on the road system and traffic;
- Impacts on air quality and potential emissions;
- Geological, soil and erosion impacts;
- Impacts on avifauna;
- Impacts on vegetation;
- Impacts on heritage resources;
- Noise impacts;
- Impacts on tourism;
- Social impacts; and
- Visual impacts.

The terms of reference for the EIA study will include criteria for the description and assessment of environmental impacts. These criteria are drawn from the *Integrated Environmental Management Guidelines Series, Guideline 5*: *Assessment of Alternatives and Impacts*, published by the DFFE in terms of the Environmental Impact Assessment. These criteria include:

Table 9. Impact Assessment Criteria

Nature of impact This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. The description should include what is being affected, and how.		
Extent The physical and spatial size of the impact.	**Site**	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
	Local	The impacted area extends only as far as the activity, e.g. a footprint.
	Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
Duration The lifetime of the impact; this is measured in the context of the lifetime of the proposed base.	**Short term**	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than any of the phases.
	Medium term	The impact will last up to the end of the phases, where after it will be entirely negated.
	Long term	The impact will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter.

	Permanent	The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
Intensity	**Low**	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
	Medium	The affected environment is altered, but function and process continue, albeit in a modified way.
	High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
Probability This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time.	**Improbable**	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
	Probable	There is a possibility that the impact will occur to the extent that provisions must be made therefore.
	Highly probable	It is most likely that the impacts will occur at some or other stage of the development. Plans must be drawn up before the undertaking of the activity.
	Definite	The impact will take place regardless of any prevention plans, and there can only be relied on mitigation actions or contingency plans to contain the effect.
Determination of significance. Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	**No significance**	The impact is not substantial and does not require any mitigation action.
	Low	The impact is of little importance but may require limited mitigation.
	Medium	The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
	High	The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

9.3. CUMULATIVE IMPACTS

Cumulative impacts will be assessed in relation to other renewable energy developments in the proximity from the proposed Lichtenburg Solar Park. Mitigation measures will be proposed, in order to mitigate the impacts that may result from the establishment of the Lichtenburg Solar Park to an acceptable level.

9.4. RISK ASSESSMENT FOR BESS TECHNOLOGY

The PV Solar Park is going to include a Battery Energy Storage System (BESS), and the fire risk must be accounted for. A Fire Management Plan was compiled and is included in Annexure M. The primary focus is on the fire hazards associated with Li-ion batteries and the potential for a condition known as "thermal runaway". Thermal runaway results from internal shorts inside a battery cell which occur due to a variety of reasons and can ultimately lead to the battery catching fire.

The following measures will reduce the fire risk to an acceptable level:

- The Battery Management System should include a device to preclude, detect, and control thermal runaway.
- The BESS should incorporate appropriately certified inverters/inverter systems and must comply with other recognised safety standards which address risk assessment and controls.
- BESS must be away from buildings or equipment and located in a non-combustible enclosure. Sufficient clearance must be maintained the installation to provide fire service access.
- Clear signage should be visible to include warnings of a possible fire hazard.
- An approved, monitored, automatic smoke detection system must be installed at the BESS. A fire suppression system must be designed and installed at the BESS.
- Regular inspections must be undertaken to ensure the battery systems are not overheating.
- Portable fire extinguishers must be provided at the BESS.
- Installations should have emergency power disconnects to ensure manual, remote, and local disconnect is possible adjacent to the BESS.
- BESS must have an online condition monitoring system, which must be fitted with temperature monitoring which incorporates a high temperature alarm for the battery room and container. Temperatures should be monitored at a constantly attended location (Control room).

More detail regarding on site fire management is included in the report in Annexure M.

9.5. SPECIALIST STUDIES

Detailed studies on potentially significant impacts have been carried out to address the impacts throughout the EIA process. Specialist studies conducted and included in this report are the following:

- Annexure C Terrestrial Biodiversity Impact Assessment
- Annexure D Avifaunal Assessment
- Annexure E Wetland Statement
- Annexure F Agro-Ecosystem Specialist Report

- Annexure G Archaeological Impact Assessment
- Annexure H Palaeontological Impact Assessment
- Annexure I Visual Impact Assessment
- Annexure J Draft Traffic Impact Assessment Report
- Annexure K Aviation Impact Report
- Annexure L Socio - Economic Impact Assessment
- Annexure M Fire Management Plan
- Annexure N Environmental Screening Report

The following specialist reports will be conducted for the EIA phase:

- Storm Water Management Plan

9.6. TERMS OF REFERENCE FOR SPECIALIST STUDIES

9.6.1. Ecological (Terrestrial Biodiversity) Impact Assessment (Annexure C)

Objectives

- The primary aim of this project is to investigate options for enhancing and/or maintaining biodiversity to mitigate the impact of the proposed development and related infrastructure with the overall objective of preventing further loss of biodiversity. The end product would be a tool for promoting and lobbying for the recognition of the importance of species habitat and habitat conservation. Options available to maintain the current level of floral diversity include:
  - Protection of native vegetation restored elsewhere in return for unavoidable clearing;
  - Minimisation of habitat fragmentation;
  - Minimisation of any threats to the native flora and fauna and their habitats during the construction and operational phases of the developments and;
  - Rehabilitation to establish plant communities / landscaping that will provide future habitat values.
- To produce a clear and agreed species and habitat priorities for conservation actions. This includes the following:
  - Determine the potential ecological impacts and actions the developments will have on the biodiversity on a species and habitat level;
  - Conduct a risk analyses of the impacts identified to determine the significance of the impacts on the fauna and flora of the study area;
  - Protection and enhancement of vegetation / habitats of high conservation value;
  - The retention of a substantial amount of native vegetation / habitat of adequate size and configuration to promote the conservation of the existing flora communities;
  - The retention and / or creation of vegetation links, wildlife corridors and vegetation buffers wherever possible, subject to the appropriate bush fire risk management; and
  - The protection of water quality in the locality so as not to threaten native aquatic flora that rely on the watercourse for survival.
- Provide recommendations on the ecological mitigation measures to be implemented by the developer and the way forward.

Scope

- Detailed flora survey – in each vegetation type/plant community on site:
  - After studying the aerial photograph identify specific areas to be surveyed and confirm location by making use of a Geographical Positioning System (GPS).
  - Conduct a site visit and list the plant species (trees, shrubs, grasses, succulents and other herbaceous species of special interest) present for plant community and ecosystem delimitation.
  - Identify potential red data plant species, possible encroacher species, medicinal plants of value and exotic plant species.
  - Indicate suitable plant species that can be used for the landscaping around the proposed developments.

- Plant community delimitation and description:
  - Process data (vegetation and habitat classification) to determine vegetation types on an ecological basis.
  - Describe the habitat and vegetation.

- Fauna scoping:
  - List potential fauna (mammal species, red data birds, reptiles, amphibians, invertebrates) presently linked to specific potential habitats that occur as identified in vegetation survey.
  - Analyse the data and identify potential red data fauna species, as well as other endemic or protected species of importance.
  - Indicate species mitigation measures and management measures to be implemented to prevent any negative impacts on the fauna of the area.

- General:
  - Identify and describe ecologically sensitive areas. Create a sensitivity map to indicate specific sensitive areas based on various environmental parameters such as natural vegetation in a good condition, rockiness, slopes, flood lines etc.
  - Identify problem areas in need of special treatment or management, e.g. bush encroachment, erosion, degraded areas, reclamation areas.
  - Make recommendations, impact ratings and risk assessments for each specific impact.

9.6.2. Wetland Statement (Annexure E)

Objectives

- Confirmation that no wetlands / water courses occur on the proposed development footprint or within 500 meters (as stipulated in the National Water Act, 1998 (Act No. 36 of 1998)) of the Lichtenburg Solar Park and power line on Portion 25 of the Farm Houthaalboomen 31 IP and Portion 10 of the Farm Lichtenburg Town and Townlands 27 IP, Ditsobotla Local Municipality.

9.6.3. Avifauna Impact Assessment (Annexure D)

Objectives

- The objective of this study was to carry out a preliminary avifaunal survey and assessment of the footprint area of the proposed Lichtenburg Solar Park. To assess the potential impacts that the proposed development may hold along with mitigating actions that can be implemented to limit or revoke these threats, the guidelines and recommendations as suggested by the Best Practice Guidelines on Birds and Solar Energy (Jenkins et al. 2017) were followed.
- Determine the potential ecological impacts and actions the proposed solar development will have on the avifauna populations and recommend mitigation and monitoring guidelines.

Scope

- Compile a species list through a desktop analysis and a field investigation:
  - Produce species richness analysis from the point count surveys using EstimateS software;
  - Produce a detailed bird list recorded during field surveys from published data and online databases such as the South African Bird Atlas Project 2 (SABAP2);
  - Use available online databases such as SABAP2 to compile a season list.
- Identify "priority" species of conservation concern occurring within the study area,
- Identify specific regions and avian habitats in the study area that could be regarded as sensitive or which may harbour species of conservation concern,
- Identify significant bird breeding, roosting or feeding sites and possible avian flight paths or migratory routes,
- Identify potential impacts on avifauna that the proposed activity may hold,
- List mitigating actions that can be implemented to limit or revoke these threats.
- Should the proposed activity be approved, make appropriate management recommendations regarding bird and habitat conservation on the site.
- Identify No-Go areas.

9.6.4. Agricultural Potential Soil Assessment (Annexure F)

Objectives

- Conduct a soil survey on the proposed development site and identify the different soil types / forms present on the site;
- From the soil survey results link the optimal land use and other potential uses and options to the agricultural potential of the soils by classifying the soils into different Agricultural Potential classes according to the requirements set by the Department of Agriculture, South Africa. From these results soil maps and an agricultural potential map will be compiled;
- Discussion of the agricultural potential and land capability in terms of the soils, water availability, grazing capacity, surrounding developments and current status of land;
- Identify potential impacts of the development on the soils and provide mitigation measures to manage these impacts.

9.6.5. Heritage and Palaeontological Impact Assessments (Annexures G and H)

The heritage component of the EIA is provided for in the National Environmental Management Act, (Act 107 of 1998) and endorsed by section 38 of the National Heritage Resources Act (NHRA - Act 25 of 1999). In addition, the NHRA protects all structures and features older than 60 years (see Section 34 of the Act), archaeological sites and material (see Section 35 of the Act) and graves as well as burial sites (see Section 36 of the Act). The objective of this legislation is to enable and to facilitate developers to employ measures to limit the potentially negative effects that the development could have on heritage resources.

Based hereon, this project functioned according to the following terms of reference for heritage specialist input:

- Provide a detailed description of all archaeological artefacts, structures (including graves) and settlements which may be affected, if any.
- Assess the nature and degree of significance of such resources within the area.
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance.
- Assess any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.
- Propose possible heritage management measures provided that such action is necessitated by the development.
- Liaise and consult with the South African Heritage Resources Agency (SAHRA).

9.6.6. Socio-economic Impact Assessment (Annexure L)

The purpose of this assessment was to document socio-economic issues at the conceptual level that was considered as part of the EIA of the proposed Lichtenburg Solar Park.
The study was conducted according to the following terms of reference and scope of work:

Terms of Reference

- Project Description from a socio-economic perspective
- Socio-Economic context of Ditsobotla Local Municipality
- Proposed project fit within the national, provincial and local development policy context

Scope of Work

- Anticipated economic impact of the project
- Other socio-economic considerations
- Conclusion and recommendations

9.6.7. Visual Impact Assessment (Annexure I)

Terms of Reference

A specialist study is required to establish the visual baseline and to identify and assess the visual impacts arising from the Project based on the general requirements for a comprehensive VIA. The following terms of reference was established:

- Data collected during a site visit will allow for a description and characterization of the receiving environment.
- Identify issues that must be addressed in the impact assessment phase.
- Describe the landscape character, quality and assess the visual resource of the study area.
- Describe the visual characteristics of the components of the project; and
- Rate the significance of impact of the project.
- Proposed mitigation measures to reduce the potential impact of the project.

Methodology

The following methods were used:

- Site visit: A field survey will be undertaken and the study area will be scrutinized to the extent that the receiving environment could be documented and adequately described.
- Project components: The physical characteristics of the project components will be described and illustrated based on information received.
- General landscape characterization: The visual resource (i.e. receiving environment) will be mapped using the field survey, Google Earth imagery and Mucina and Rutherford's (2006) reference book, The Vegetation of South Africa, Lesotho, and Swaziland. The description of the landscape will be focused on the nature of the land rather than the response of a viewer.
- The character of the landscape will be described and rated in terms of its aesthetic appeal using recognized contemporary research in perceptual psychology as the basis, and its sensitivity as a landscape receptor.
- Sense of place of the study area will be described as its uniqueness and distinctiveness. The primary informant of these qualities was the spatial form and character of the natural landscape together with the cultural transformations associated with the historic / current land-use.
- Visibility of proposed Project will be determined using computer generated viewshed analyses.
- Illustrations, in basic simulations, of the proposed project will be overlaid onto panoramas of the landscape, as seen from nearby sensitive viewing points to give the reviewer an idea of the scale and location of the proposed project within their landscape context3.
- Visual intrusion (contrast) of the proposed project will be determined by simulating its physical appearance from these sensitive viewing areas.
- The impact on the visual environment of the proposed project will be rated based on a professional opinion and the method described above; and
- Measures to mitigate the negative impacts of the proposed project will be recommended.

9.6.8. Traffic Impact Assessment report (Annexure J)

The purpose of the traffic study is:
a) To determine the status quo of the relevant road network adjacent the proposed development.
b) To determine and identify any potential traffic management constraints for the proposed development.

- The *status quo* of the land use and road network characteristics of roads relevant to the proposed development which consists of the following information:
    - Existing land use information.
    - Existing road characteristics and modal distribution.
    - Traffic counts as a basis for making traffic-engineering calculations.
- The future land use and road network characteristics relevant to the proposed development which consists of the following information:
    - Land use information, including existing and proposed approved future developments in the area.
    - Determination of vehicle trips expected to be generated due to the proposed development.

- Access to and from the proposed development.
- The current levels of service at the relevant intersections under investigation.
- Other traffic-related matters.

9.6.9. Stormwater Management Plan

The purpose of this report is to provide an oversight of the hydrological setting of the projects, and to provide the scope of work for further hydrological assessment and the development of the Storm Water Management Plan for the Solar plant site.

Aspects of importance in the management plan are:

- Hydrological characteristics including flood volumes, possible flood line challenges and general flow patterns expected on site. (Topography and climatological drivers).
- Water quality due to site activities.
- Mitigating the hydrologic impact of the solar farm development.

The purpose of the Storm Water Management Plan (SWMP) must be to:

- provide guidance to align all phases of development and the eventual operation to the relevant Acts of Law.
- provide for rational thinking in concept development and design.
- minimise risk of on site and / or downstream damage due to hydrological impact. This includes exposure to runoff associated with normal rain, as well as during more extreme flood events.
- To minimise the risk to on site and / or downstream contamination through storm water due to waste on site.
- It needs to consider the impact of rain on the site, the impact of water entering the site from higher ground and the impact of water leaving the site.

The SWMP Report will not be a design report; guidance is given in it for compliance by the eventual design-implementation- and operational teams.

The technical parameters to be detailed in the stormwater management plan are

- Geographical orientation
- Topography of the site
- Surface conditions on site
- Climatic conditions in the area
- Hydrological setting of the area

10. DECOMMISSIONING PHASE

Decommissioning activities of the PV plant mainly include removal of project infrastructure and restoring of the site's *status quo ante*.

The decommissioning phase will start at the end of the PV power plant lifetime (approx. 30 years) and will last approximately 8 months, involving a team of 150 workers.

Decommission will be subject to a decommissioning plan once the project is nearing its operational life (30 years). Decommissioning will also be subject to an environmental authorisation.

10.1. SITE PREPARATION

In order to ensure a correct decommissioning of the site, the first step of the process will include adequate site preparation. Integrity of access points and of lay down areas will be confirmed and eventually re-established in order to accommodate equipment and to load vehicles.

10.2. DISASSEMBLE AND REPLACEMENT OF EXISTING COMPONENTS

All components will be disassembled. Silicon of the PV modules will be recycled, as well as mounting structures (aluminium or zinced steel frames and piles) and cables (copper and/or aluminium conductor).

Non-recyclable components of inverter, transformers and electrical devices will be disposed in appropriate way, in compliance with applicable laws and international standards.

10.3. RESTORATION OF THE SITE

Adequate measures will be undertaken in order to restore the site by re-planting of indigenous plant species.

10.4. ALTERNATIVE OPTION: UPGRADING THE SOLAR PARK

At the end of the PV power plant lifetime (approx. 30 years), as alternative option to the decommissioning, it will be evaluated the feasibility of upgrading the solar park with the most appropriate technology/infrastructure available at that time.

11. CONCLUSIONS AND RECOMMENDATIONS

This Draft Scoping Report and Plan of Study for Environmental Impact Assessment (EIA) describe the activities that will be undertaken for the proposed development of the Lichtenburg Solar Park and give an indication to the DFFE related to the EIA which assessments will be conducted.

A detailed assessment of the status quo of the receiving environment was conducted, in order to ensure that all pertinent environmental aspects were correctly identified and addressed.

A comprehensive public participation process will be conducted during the Scoping Phase (details of the public participation process are enclosed under Annexure B). All issues and questions raised will be noted and addressed during the EIA phase.